Service Manual

MINOLTA XE (081•084)
MINOLTA XE-1 (082•085)
MINOLTA XE-7 (086)

MINOLTA

MINOLTA XE 081 · (084)
MINOLTA XE-1 082 · (085)
MINOLTA XE-7 (086)

( ) Black body

SHUTTER

Electronic Control of the Metal Focal Plane Type

Exposure: Automatic 4 ~ 1/1000 sec. (Non stage shutter speed)
Manual X, B, 4, 2, 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500 and 1/1000 sec.
X 1/90 sec.
X and B are of the mechanical control type, and are workable without batteries.

Dial: Single, non-spinning, equal space, click-stopped dial (with an automatic position lock)

Synchro Contact: JIS-B type, FP-X contact one terminal selection Hot Shoe (with an electric shock preventive)

Synchro Range: X . . . Used at X and other shutter speeds slower than 1/60 sec.
FP . . . All speeds

Self-timer: Operating time adjustable (with a set angle index operating.
Time – Approx. 6 ~ 10 sec.

FILM ADVANCE

Winding Method: Single-stroke winding by a lever (Winding with several small strokes are impracticable)

Winding Angle: 130° with an allowance of 30°

Spool: 4 - nail film reversal

Counter: Automatic resetting counter showing exposed frame number.

Film Rewinding: Push-stop type with R button (for automatic return) Rewinding with a crank of the folding type.

Film Loading: Locking of the back cover of the hinge type Unlocking by pulling up the rewinding knob.

Multiple Exposure: Possible by shifting to the multiple exposure lever automatic release by winding.

VIEWFINDER

Type: Eye-level viewfinder using a penta-prism.

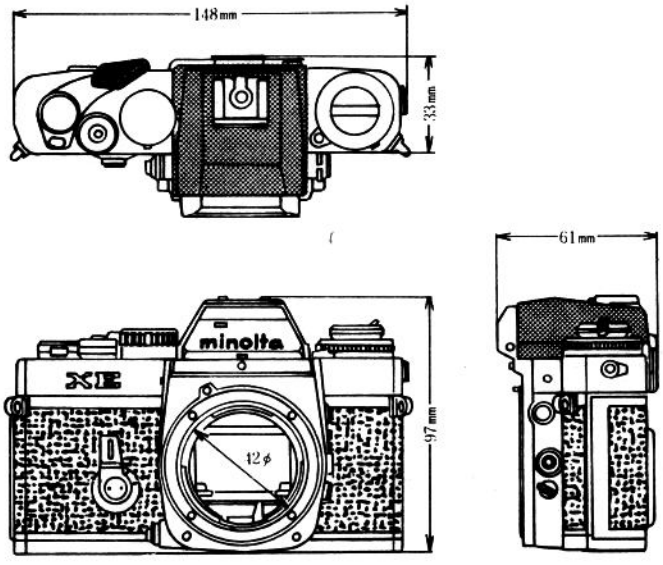
Focusing Plate: Mat-Fresnel field focusing screen.

Visual Field Percentage: 94%
(for the standard frame, 24 x 36mm)

Image Magnification: 84%
(with a 50mm lens on infinity)

Unit of Measurement: –1.0 diopter

Indication in Viewfinder:
Meter indication (Meter pointer and speed scale)
Set aperture figure
Figure of the speed dial



EXPOSURE ADJUSTING SYSTEM

Automatic Exposure Adjustment Type with Priority to Thru - the Lens (TTL), Contrast Lignt Compensator (CLC) Aperture Setting

Working Range: EV1 ~ EV17 on 100 ASA film at F1.2
EV1.5 ~ EV17 on 100 ASA film at F1.4

Meter Indication Range: 4 ~ 1/1000 sec.

Automatic Exposure: Automatic control of the exposure time by the memory circuit using IC

Film Speed Scale: ASA 12 . . . 25 . . . 50 . . . 100 . . . 200 . . . 400 . . . 1600 . . . 3200
No DIN scale (ASA-DIN conversion plate attached to the film pocket of the back cover)

With Manual Override: +2, +1, 0, –1 and –2 EV

Coupling of Aperture Setting:
MC coupler, pressed lop-sidedly by the MC ring on the lens side, is coupled.
Coupled aperture setting: 8 stages

Batteries: Silver oxide batteries 1.5V x 2
JIS-G13 type
S-76 (Eveready)
MS-76 (National)
RS-76G (Ray-O-Vac)

DIMENSIONS and WEIGHT

Dimensions: 148(W) x 97(H) x 61(L)mm

Weight: 775g (Body only)

Explanation of Systems

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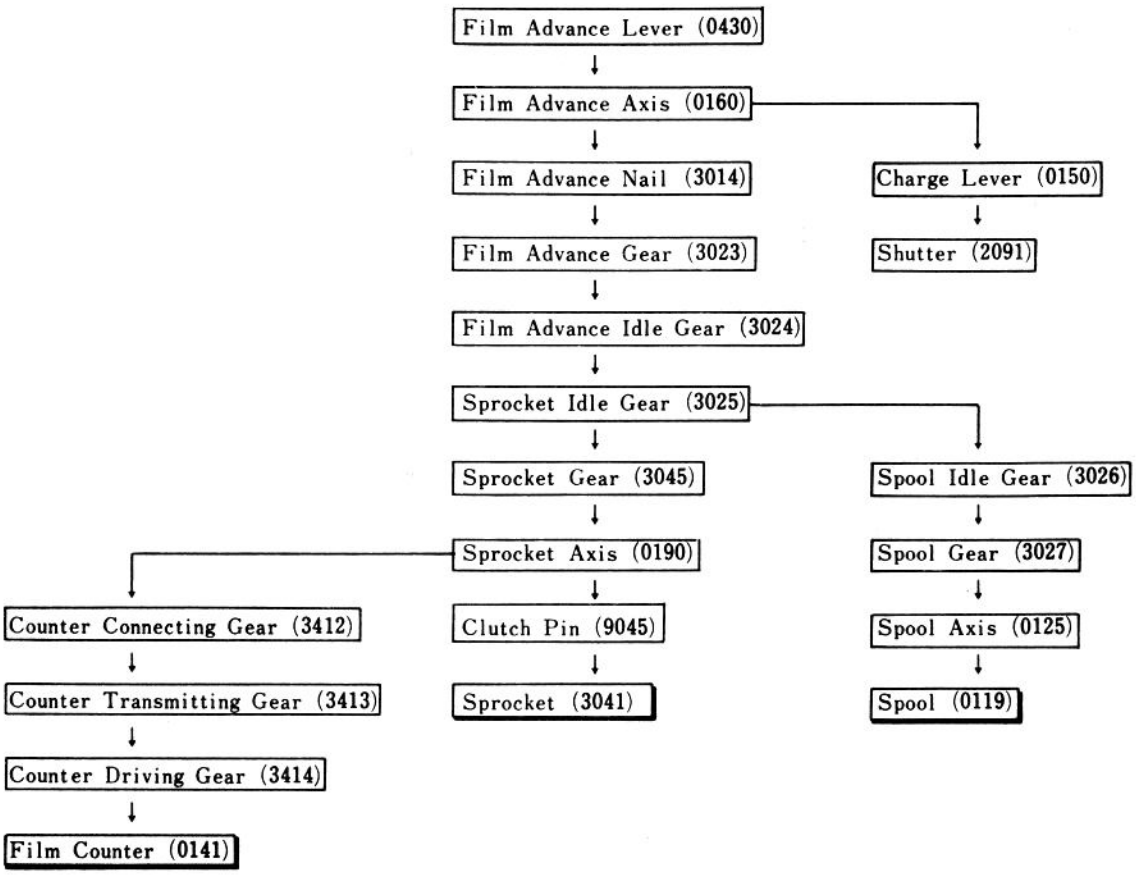
1. Film Advancing System

(Operating Order)

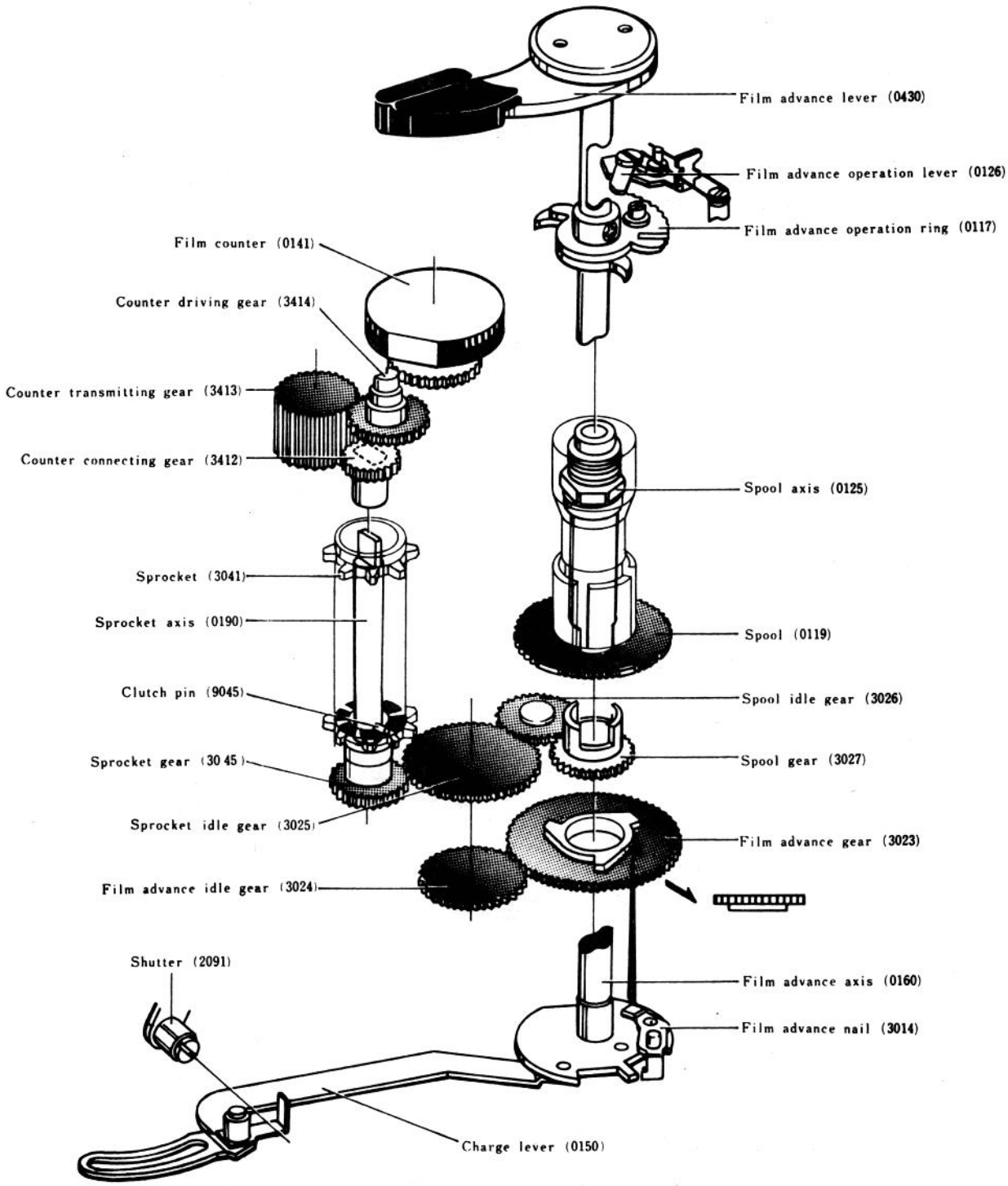
(The arrow marks indicate interlocking relations.)



Points Requiring Positioning

- Film Advance Gear (3023) ←→ Film Advance Idle Gear (3024)
- Sprocket Gear (3045) ←→ Sprocket Idle Gear (3025)
- Sprocket Axis (0190) ←→ Counter Connecting Gear (3412)
- Counter Driving Gear (3414) ←→ Counter (0142)

The film advance operating ring (0117) is checked by the film advance operation lever (0126) in the course of the film advance operation, and the film advance axis (0160) won't return.
The film advance lever (0430) can be stored even in the course of the film advance operation.
Since the sprocket (3041) has 6 nails, one film advance operation enables the sprocket (3041) to revolve 1⅓ times.


Film advance lever (0430)
Film advance operation lever (0126)
Film advance operation ring (0117)
Film counter (0141)
Counter driving gear (3414)
Counter transmitting gear (3413)
Counter connecting gear (3412)
Spool axis (0125)
Sprocket (3041)
Sprocket axis (0190)
Spool (0119)
Clutch pin (9045)
Spool idle gear (3026)
Sprocket gear (3045)
Spool gear (3027)
Sprocket idle gear (3025)
Film advance gear (3023)
Film advance idle gear (3024)
Shutter (2091)
Film advance axis (0160)
Film advance nail (3014)
Charge lever (0150)

2. Multiple Exposure System

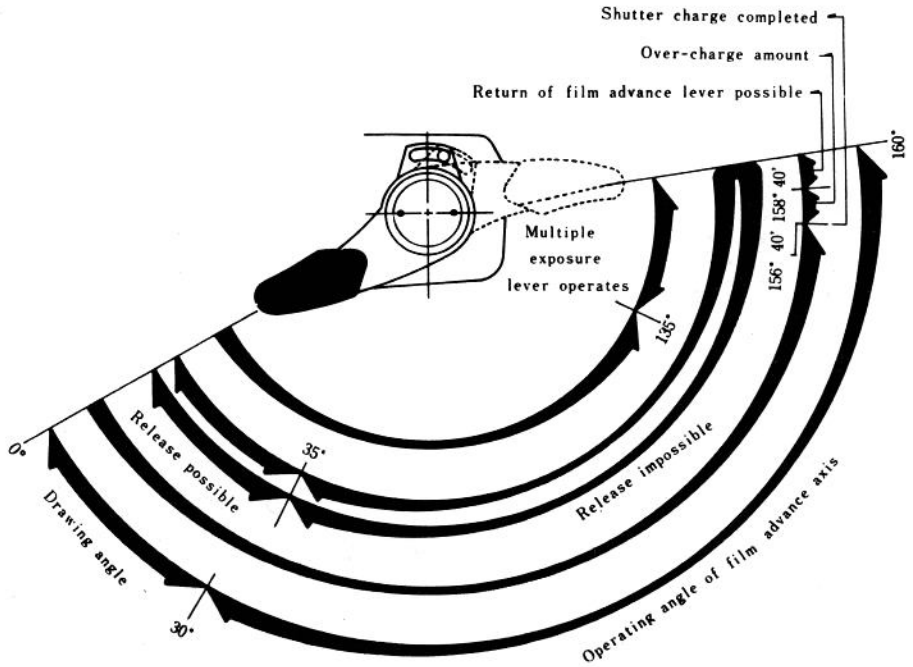
〔Operation〕

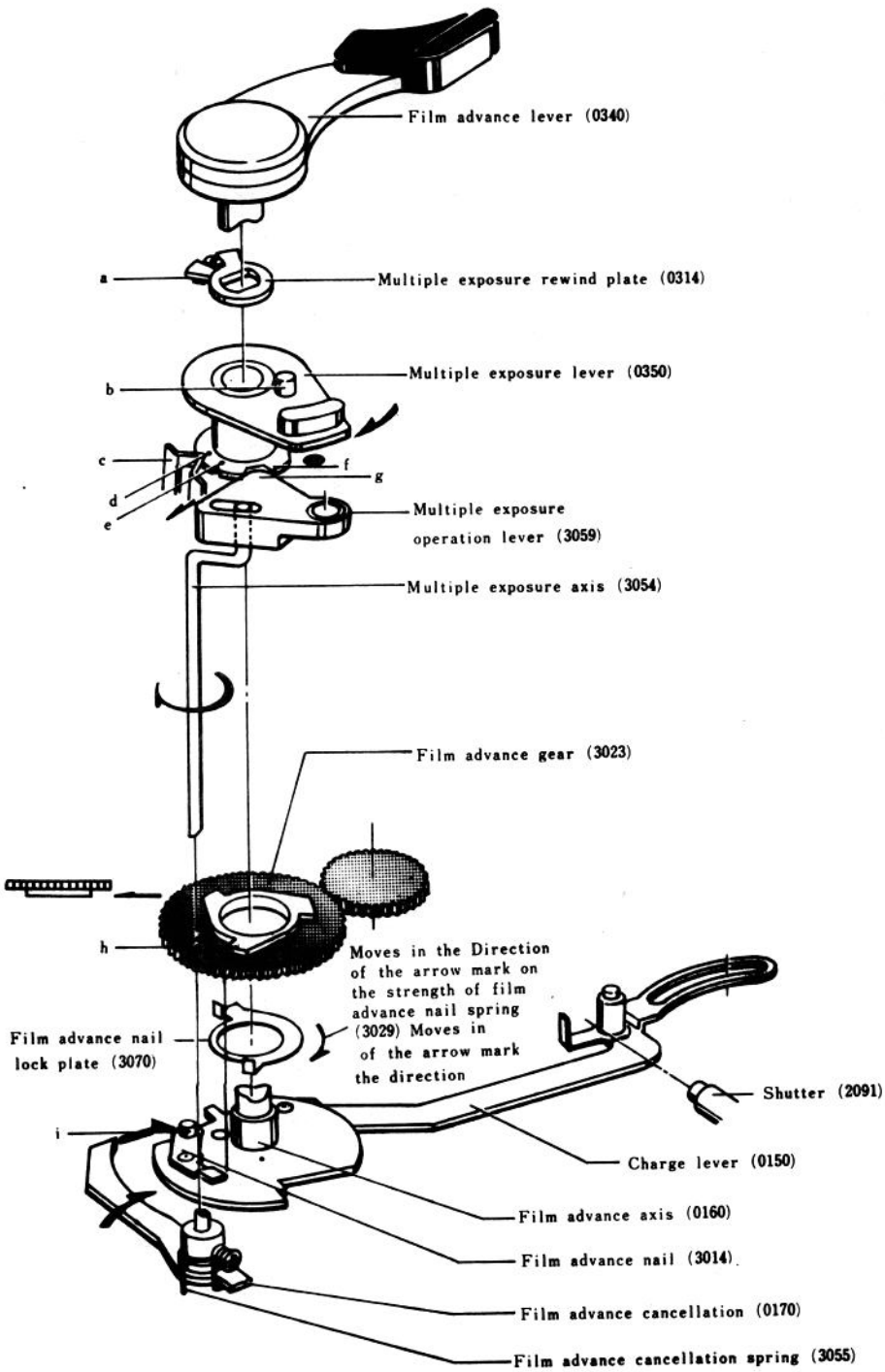
1. When Multiple Exposure Lever (0350) moves in the direction of the arrow mark until (e) becomes coupled with (c), (g) of Multiple Exposure Operation Lever (3059) will be pushed be pushed by (f) and will move in the direction of the arrow mark.
2. Multiple Exposure Axis (3054) will revolve in the direction of the arrow mark due to the movement of Multiple Exposure Operation Lever (3059), and Film Advance Cancellation (0170) will move in the same direction.
3. (i) of Film Advance Nail (3014) will be pushed due to the movement of Film Advance Cancellation (0170), and Film Advance Nail (3014) will be disengaged from (h) of Film Advance Gear (3023). Thus the preparations for the multiple exposure operation will be completed.
4. When Film Advance Lever (0340) is operated, Film Advance Axis (0160) will operate. However, Film Advance Gear (3023) won't work because Film Advance Nail (3014) is disengaged. The film will remain stationary because none of Spool, Sprocket and Counter works. Only Charge Lever (0150) will work and charge Shutter (2091), making multiple exposure feasible. Immediately after the start of the operation of Film Advance Axis (0160), Film Advance Nail Spring (3029) will make Film Advance Nail Lock Plate (3070) move in the direction of the arrow mark and check Film Advance Nail (3014), and thus adquate multiple exposure will be ensured.

〔Release〕

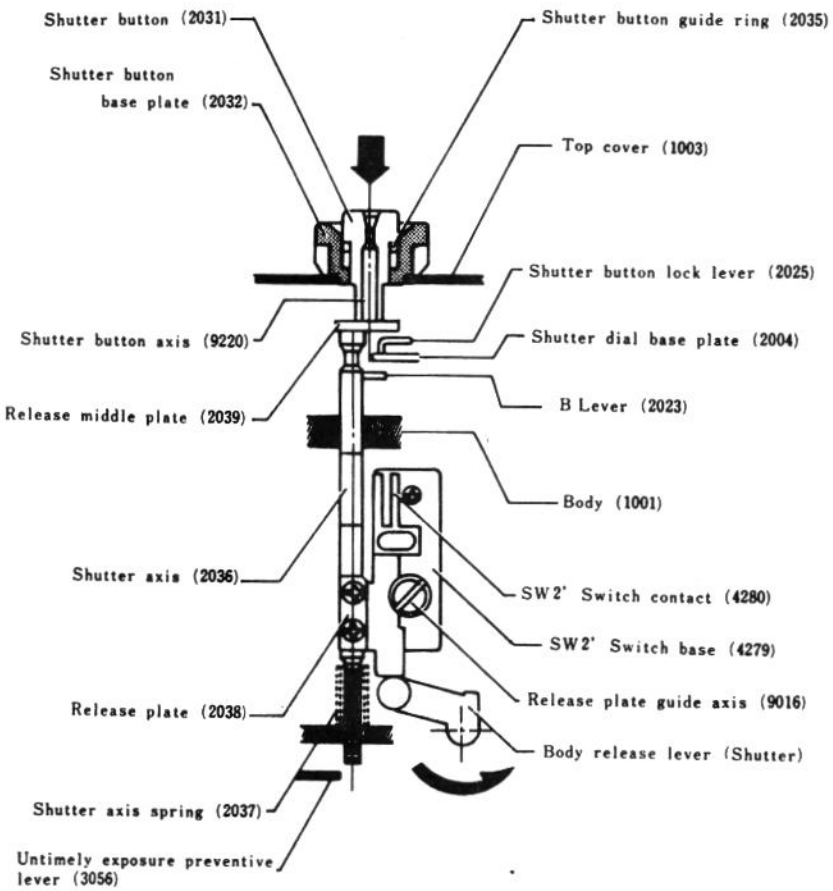
1. Advance Film Advance Lever (0340) for about 130°, and (b) of Multiple Exposure Lever (0350) will be pushed by (a) of Multiple Exposure Rewind Plate, and (d) will be pushed back in the opposite direction to the arrow mark until it becomes coupled with (c).
2. When Multiple Exposure Lever (0350) is pushed back, Multiple Exposure Operation Lever (3059) will become free, and Film Advance Cancellation Spring (3055) will make Film Advance Cancellation (0170) work in the opposite direction to the arrow mark.
3. Immediately before the complete return of Film Advance Axis (0160), Film Reversion Check Nail B (3065) will make Film Advance Nail Lock Plate (3070) move in the opposite direction to the arrow mark. Then Film Advance Nail (3014) will be released, and Film Advance Nail (3014) will return to (h) of Film Advance Gear (3023). Thus with the release of multiple exposure, preparations for the film advance operation will be completed.

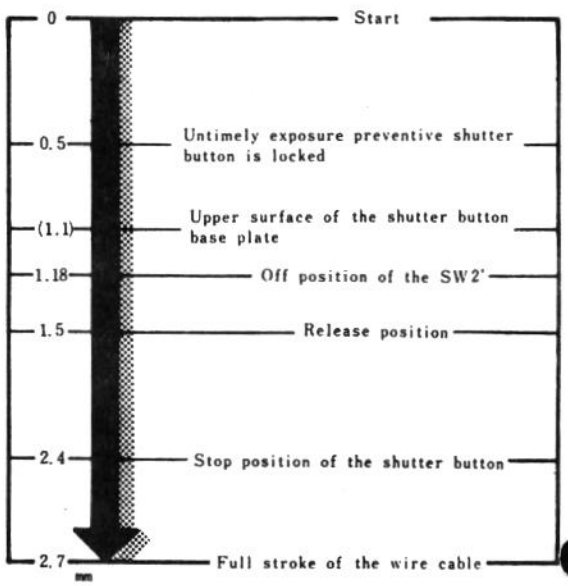
3. Film Advance Lever Operation



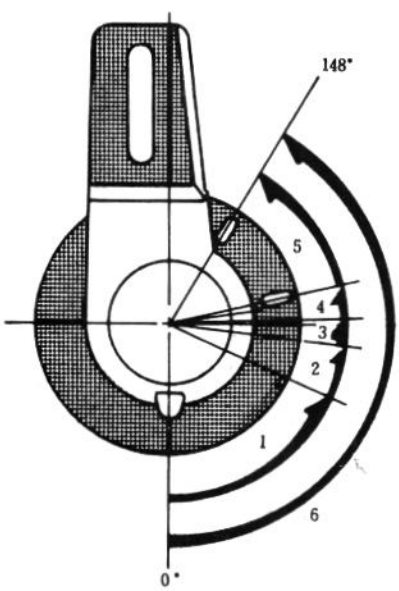

Film advance lever (0340)
a
Multiple exposure rewind plate (0314)
b
Multiple exposure lever (0350)
c
f
g
d
e
Multiple exposure
operation lever (3059)
Multiple exposure axis (3054)
Film advance gear (3023)
h
Moves in the Direction
of the arrow mark on
the strength of film
advance nail spring
(3029) Moves in
of the arrow mark
the direction
Film advance nail
lock plate (3070)
Shutter (2091)
i
Charge lever (0150)
Film advance axis (0160)
Film advance nail (3014)
Film advance cancellation (0170)
Film advance cancellation spring (3055)

4. Release of Shutter





5. Operation of Self-Timer Lever

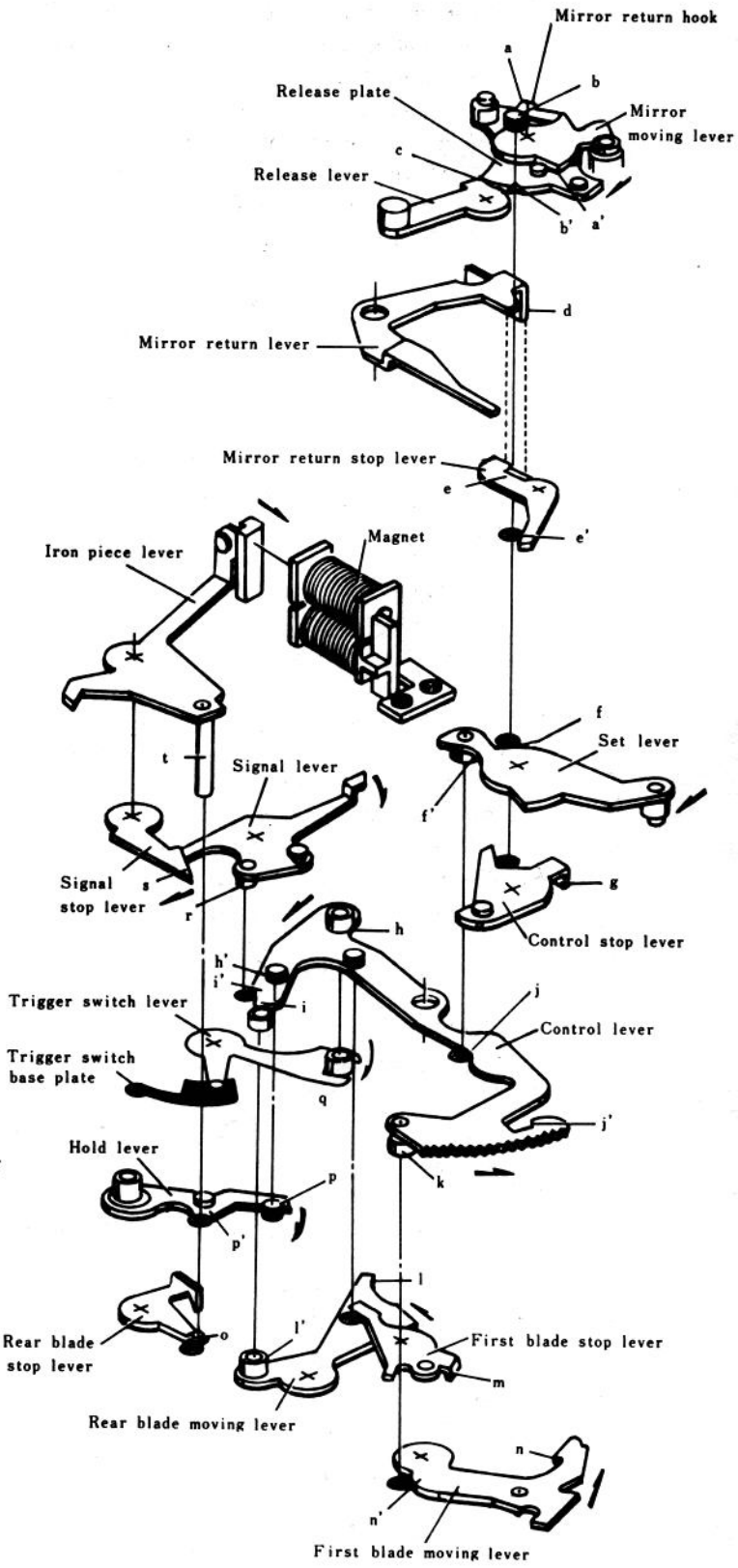


1. The lever will return within the range of (1), but the shutter won't be released.
2. The lever will return within the range of (2) without pressing the self-start button, and the shutter will be released.
3. The lever won't return within the range of (3). If, however, the self-start button is pressed, the lever will return and shutter will be released.
4. The lever won't return within the range of (4), It won't work even if the self-start button is pressed.
5. (5) indicates the useable range of the self-timer lever.
6. (6) indicates the full operating angle of the self-timer lever.

6. Shutter System

A. Charge System

1. Set Lever will be charged in the direction of the arrow mark by operating Film Advance Lever (0340).
2. Release Plate (b) will be pushed and charged by Set Lever (f) in the direction of the arrow mark, and (b') will be stopped by Release Lever (c).
3. Control Lever (j) will be pushed and charged by Set Lever (f') in the direction of the arrow mark, and Control Lever (j) will be stopped by Control Stop Lever (g).
4. After stopping Release Plate and Control Lever, Set Lever will return to its original position.
5. Release Plate will: (i) have (b) free Control stop Lever; (ii) have (b) push Mirror Return Stop Lever (e'), disengage Mirror Return Lever (d) and Mirror Return Stop Lever (e), and free Mirror Return Lever; and (iii) have Mirror Return Hook (a) charge Mirror Return Lever (a').
6. Control Lever will: (i) have (k) charge First Blade Moving Lever (n') in the direction of the arrow mark, have First Blade Stop Lever (m) stop (n), and charge First Blade; (ii) have (i) charge Rear Blade Moving Lever (l') in the direction of the arrow mark, have (o) stop Rear Blade Stop Lever, and charge Rear Blede; (iii) have (i') push and charge Signal Lever (r) in the direction of the arrow mark; (iv) have (h) push and move Trigger SW Lever (q) in the direction of the arrow mark, and turn off Trigger SW; and (v) have (h') disengage and move Hold Lever (p) in the direction of the arrow mark, and have Hold Lever (p') push Iron Piece Lever (t) in the direction of the arrow mark.
7. Iron Piece Lever (t) will push and charge Signal Stop Lever (s) in the direction of the arrow mark, preparations will be made for stopping Signal Lever; and thus the charging operation will be completed.

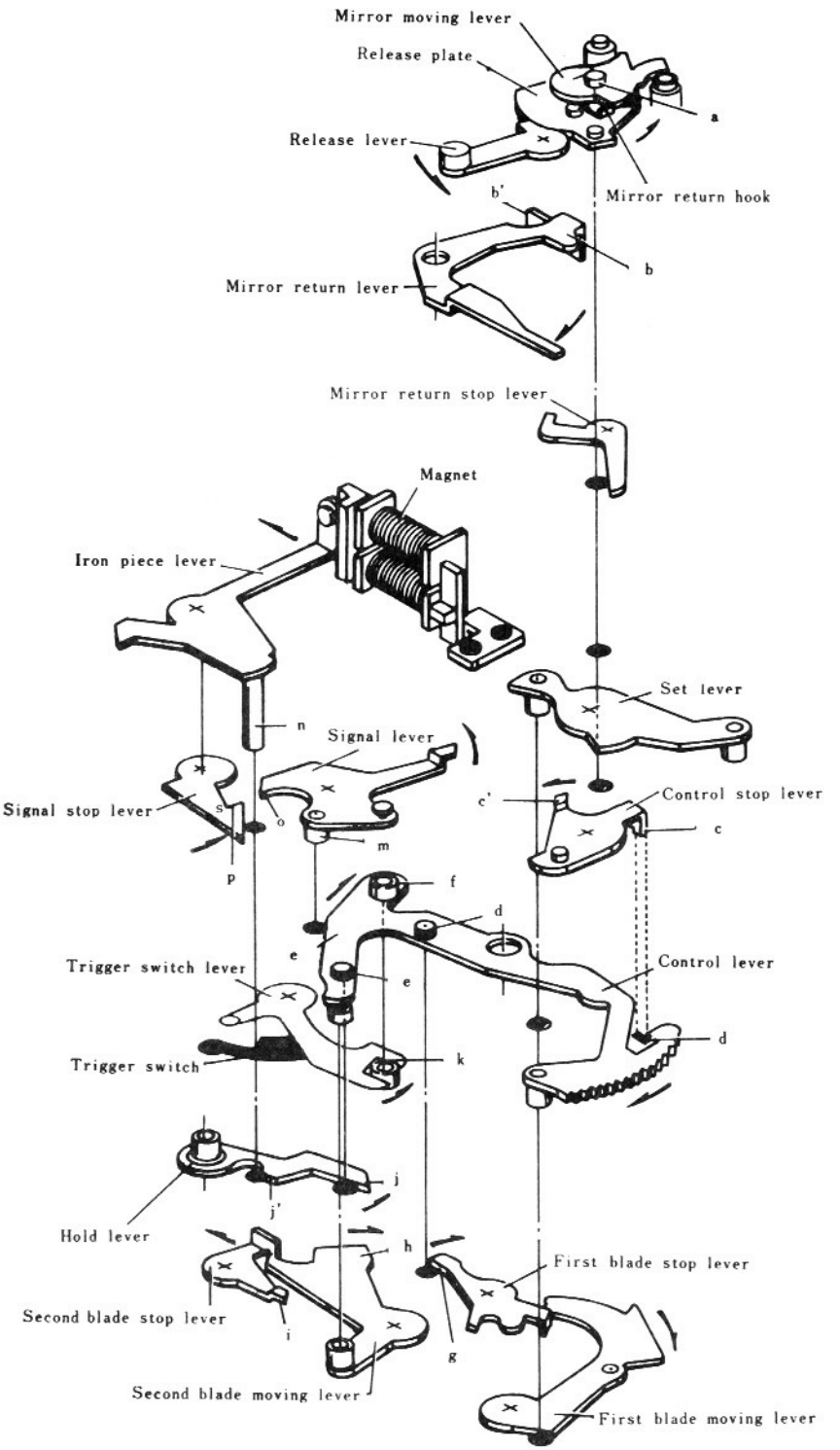


B. Electric Shutter System

1. When Shutter Button is released, Release Lever will move in the direction of the arrow mark and will be disengaged from Release Plate. Then Release Plate will move in the direction of the arrow mark.
2. The movement of Release Plate will have Mirror Moving Lever work and kick up Mirror Operating Lever (on the side of Mirror Box). Thus Mirror will be moved up, SW 5 and Magnet will be turned on, and Iron Piece Lever will be attracted.
3. The movement of Release Plate will have (a) push Control Stop Lever (c') in the direction of the arrow mark and disengage (c) from Control Lever (d), and Control Lever will move in the direction of the arrow mark.
4. The movement of Control Lever will: (i) have (d') push First Blade Stop Lever (g) in the direction of the arrow mark, disengage it from First Blade Moving Lever and have it move in the direction of the arrow mark, and First Blade will start moving; (ii) simultaneously with the start of exposure, have (f) push and move Trigger SW Lever (k) in the direction of the arrow mark, turn on Trigger SW, and have the counting of Electric Shutter started by the second; (iii) have Signal Lever (m) move in the direction of the arrow mark along (e') and release Mirror Lock Lever (on the side of Mirror Box); and have (e) push and move Hold Lever (j) in the direction of the arrow mark, release contact between (j) and Iron Piece Lever (n), and keep Iron Piece Lever idle due to its attraction to Magnet.
5. With the completion of the counting of Electric Shutter by the second, Magnet will be turned off, Iron Piece Lever will be released, and it will move in the direction of the arrow mark.
6. The movement of Iron Piece Lever will have (n) push Second Blade Stop Lever (i) in the direction of the arrow mark, release and move Second Blade Moving Lever in the direction of the arrow mark, and have Second Blade start moving. Thus exposure will come to an end.
7. Immediately before the completion of the running of Second Blade, Second Blade Moving Lever will have (h) push and move Mirror Return Lever (b') in the direction of the arrow mark.
8. The movement of Mirror Return Lever will have (b) push Mirror Return Hook, release Mirror Moving Lever, and have Mirror come down.

C. Signal System for Shortage of Voltage of Power Source

1. When the voltage of the power source falls below a certain level, Magnet won't be turned on even if SW 5 is turned on, and Iron Piece Lever won't be attracted. With the movement of Hold Lever, therefore, Iron Piece Lever will move in the direction of the arrow mark. Second Blade Moving Lever will move before the movement of First Blade Moving Lever, and Shutter won't open.
2. The movement of Iron Piece Lever will release Signal Stop Lever from (n), and enable Signal Stop Lever to move in the direction of the arrow mark. Since (p) stops Signal Lever (o) which moves along Control Lever, Mirror Lock Lever (on the side of Mirror Box) won't be released, and Mirror will remain upward.
3. Refer to Explanation on Mirror Box System and Signal Release System for Shortage of Voltage of Power Source for information on the release of Mirror Lock.


Mirror moving lever
Release plate
a
Release lever
Mirror return hook
b'
b
Mirror return lever
Mirror return stop lever
Magnet
Iron piece lever
Set lever
n
Signal lever
Signal stop lever
s
o
m
p
c'
Control stop lever
c
f
d
e
Trigger switch lever
e
Control lever
d
Trigger switch
k
j
j'
Hold lever
h
First blade stop lever
Second blade stop lever
i
g
Second blade moving lever
First blade moving lever

D. Operation and Synchronizing System of FP Contact

FP Contact Lever before the charging is checked by Mirror Return Lever (h) and prevents the movement of FP Contact Lever in the direction of the arrow mark.

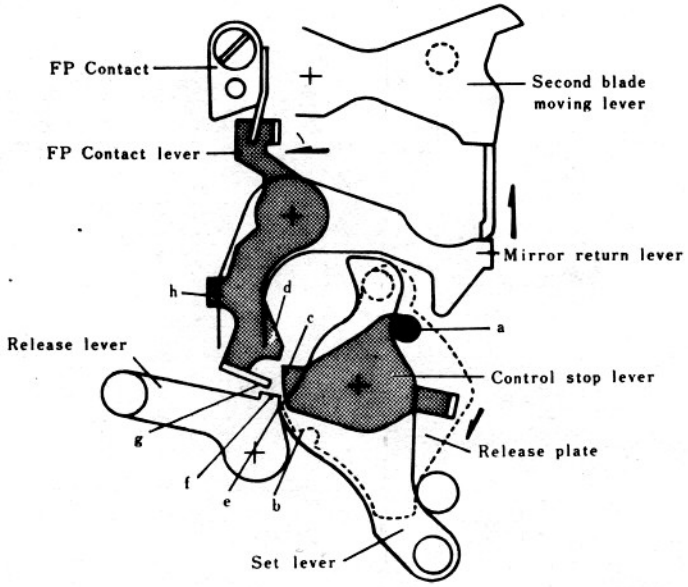
[Charge]

1. When the charging of Set Lever starts, Release Plate will be charged in the direction of the arrow mark. Release Plate (a) will move Control Lever in the direction of the arrow mark, and (c) will stop FP Contact Lever (d).
2. With the charging of Release Plate, Mirror Return Lever will move in the direction of the arrow mark, and FP Contact Lever is going to move in the same direction. However, since FP Contact Lever is stopped by Control Stop Lever beforehand, FP Contact Lever will be prevented from moving in the direction of the arrow mark.
3. When Set Lever is charged further, (e) will stop FP Contact Lever (g).
4. When Control Stop Lever stops Control Lever, Control Stop Lever will move in the opposite direction to the arrow mark and the engagement between (c) and FP Contact Lever (d) will be released. However, since FP Contact Lever (g) is stopped by Set Lever (e), FP Contact Lever will be prevented from moving in the direction of the arrow mark.
5. Control Stop Lever will stop Control Lever and also stop FP Contact Lever again. Release Plate (b) will be stopped by Release Lever (f), Set Lever will return to its pre-charged position, and thus the charging of FP Contact will be completed.

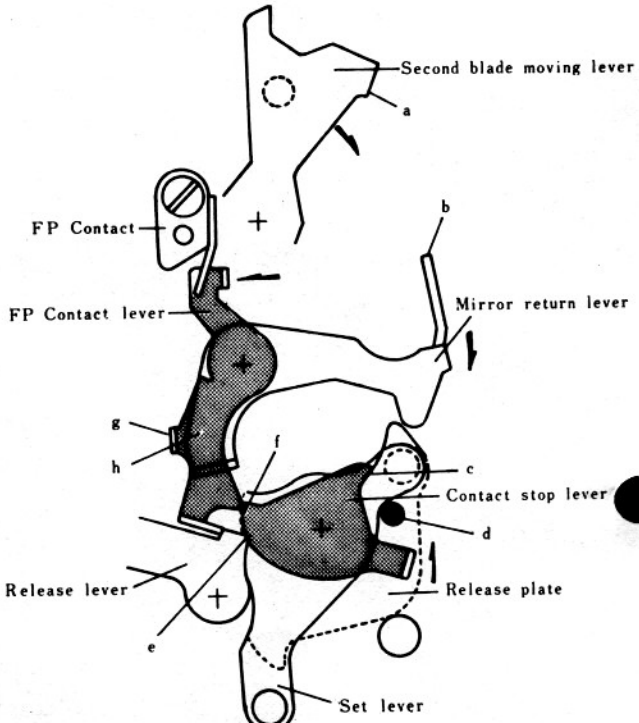
[Operation]

1. When Shutter is released, Release Lever (e) will be released and Release Plate will move in the direction of the arrow mark. (d) will push and move Control Stop Lever (c) in the same direction.
2. The movement of Control Stop Lever will release FP Contact Lever (f), which will, in turn, move in the direction of the arrow mark. Then FP Contact will be turned on.
3. Second Blade Moving Lever will move in the direction of the arrow mark. Immediately before the completion of the running of Second Blade, (a) will push and move Mirror Return Lever (b) in the direction of the arrow mark, and (h) will push and move FP Contact Lever (g) in the opposite direction to the arrow mark. Then FP Contact will be turned off.

[Charge]



[Operation]



E. Operation and Synchronizing System of X Contact

X Contact Lever before the charging will be stopped by Second Blade Moving Lever (a), and X Contact Lever will be prevented from moving in the direction of the arrow mark.

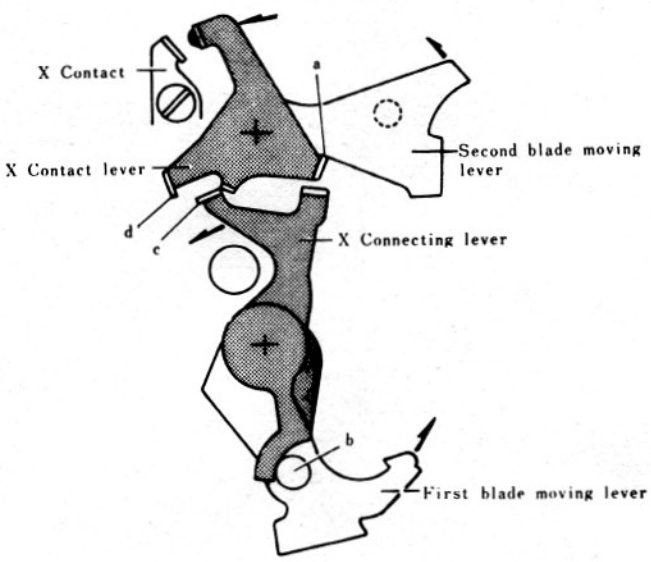
〔Charge〕

1. When the charging of Control Lever starts, First Blade Moving Lever will be charged in the direction of the arrow mark. First Blade Moving Lever (b) will release and move X Connecting Lever in the direction of the arrow mark, and (c) will stop X Contact Lever (d).
2. The movement of Control Lever will move Second Blade Moving Lever in the direction of the arrow mark. X Contact Lever is going to move in the direction of the arrow mark, but won't be able to do so because it is stopped by X Connecting Lever beforehand.
3. The further movement of Control Lever will stop First Blade Moving Lever and Second Blade Moving Lever. Thus the charging of X Contact will be completed.

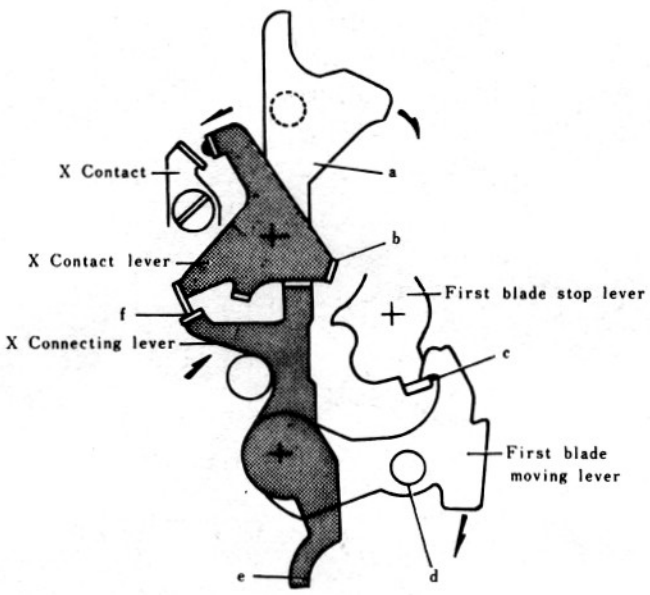
〔Operation〕

1. When Shutter is released, First Blade Stop Lever (e) will be released and First Blade Moving Lever will move in the direction of the arrow mark.
   Immediately before the completion of the running of First Blade, First Blade Moving Lever (d) will push and move X Connecting Lever (e) in the direction of the arrow mark.
2. The movement of X Connecting Lever will release X Contact Lever (f), which will, in turn, move in the direction of the arrow mark. Then X Countact will be turned on.
3. Second Blade Moving Lever will move in the direction of the arrow mark. Immediately before the completion of the running of Second Blade, (a) will push and move X Contact Lever (b) in the opposite direction to the arrow mark. Then X Contact will be turned off.

〔Charge〕



〔Operation〕



F. Mechical Shutter System

When Shutter Speed Dial stays at the auto or the manual (4-1/1000 sec.) position, Mech. Time Operation Lever (on the side of Body) will move in the direction of the arrow mark. Mech. Time Lever (b) will be pushed and suspended by (a).
When Shutter Speed Dial is positioned at X or B, Mech. Time Operation Lever will be released.

[Charge]

1. When the charging operation starts, First Blade Moving Lever will be charged in the direction of the arrow mark. First Blade Moving Lever (f) will release and move X Connecting Lever in the direction of the arrow mark.
2. The movement of X Connecting Lever will release and move Mech. Time Lever in the direction of the arrow mark. Iron Piece Lever will be pressed to Magnet in the direction of the arrow mark, and Mech. Time Lever (d) will suspend Iron Piece Lever (c).

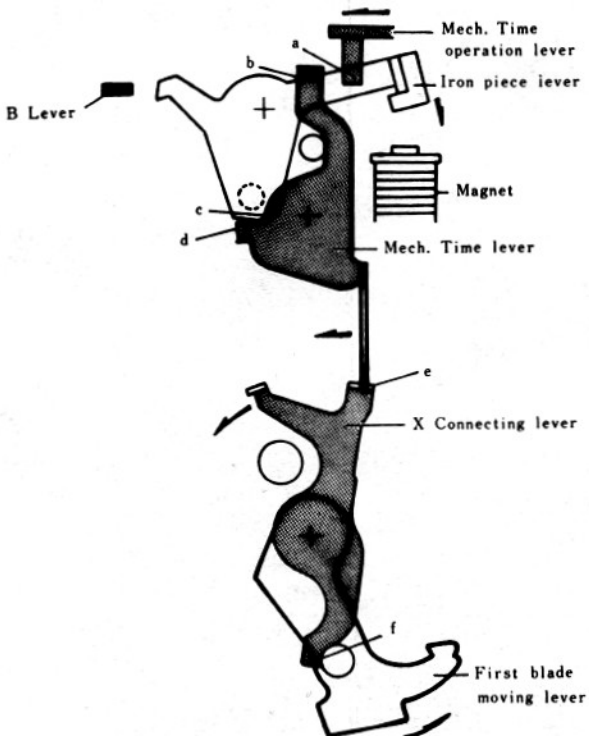
(X Operation)

1. When Sutter is released, First Blade Moving Lever will move in the direction of the arrow mark. Immediately before the completion of the running of First Blade, (d) will push and move X Connecting Lever (e) in the direction of the arrow mark.
2. The movement of X Connecting Lever will enable (c) to push and move Mech. Time Lever (b) in the direction of the arrow mark. The engagement (f) with Iron Piece Lever will be released, and Iron Piece Lever will move in the direction of the arrow mark. Then the suspension of Second Blade will be released.

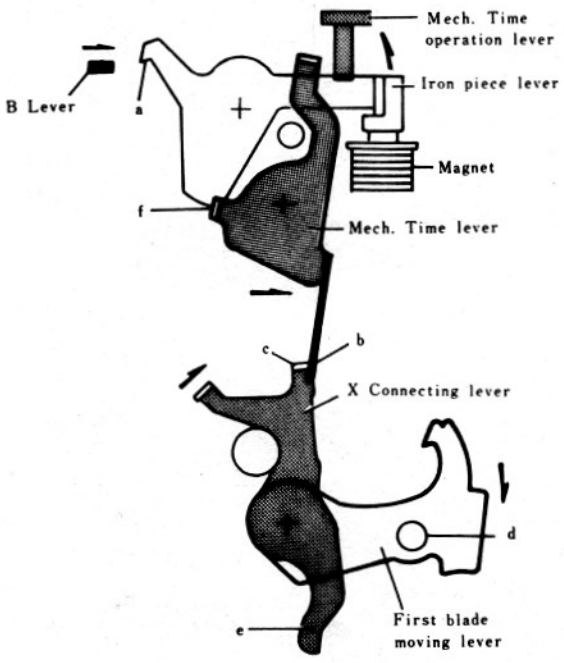
(B Operation)

1. When Shutter Speed Dial is positioned at B, the suspension of B Lever (on the side of Body) will be released.
2. When Shutter is released, B Lever will move in the direction of the arrow mark. Iron Piece Lever (a) will be suspended. Even when the engagement (f) of Mech. Time Lever and Iron Piece Lever is released, Iron Piece Lever will be prevented from moving in the direction of the arrow mark.
3. When Shutter Button moves up, B Lever will move in the opposite direction to the arrow mark, and the suspension of Iron Piece Lever will be released.

[Charge]



[X. B Operation]



7. Mirror Box System

A. Mirror Retaining System at 45°

Connection Plate remains free before or after the film advancing operation. Mirror Operation Lever will be pushed down in the direction of the arrow mark. On the strength of Mirror Return Spring. Mirror Holder, coupled with Mirror Operation Lever (a), will be retained 2 Mirror Angle Adjusting Plates, Mirror Angle Adjuster Plate and Mirror Stopper, and mirror angle will be kept at 45°. (Fig. 1)

B. Mirror Lifting and Lowering System

When Shutter Button is released, the engagement (c) of Release Lever and Release Plate will be released. Simultaneously with the movement of Release Plate in the direction of the arrow mark, Mirror Moving Lever will move and (b) will push up Connection Plate. Then Mirror Operation Lever will move in the opposite direction to the arrow mark, and (a) will lift up Mirror Holder. (Fig. 1)
When Last Blade closes following the operation of Shutter, Mirror Moving Lever will become free. Mirror Operation Lever will be pushed down in the direction of the arrow mark on the strength of Mirror Return Spring, and (a) will lower Mirror Holder. (Fig. 1)

C. Signal Cancellation System for Shortage of Voltage of Power Source

When Shutter is released below a certain level of the voltage of the power source, it won't open and First Blade and Last Blade and Last Blade will run simultaneously. With a view to giving an alarm, therefore, Signal Lever (c) won't be released, Mirror Operation Lever will be suspended by Mirror Lock Lever (d), and Mirror Holder won't come down. When Shutter Speed Dial is positioned at B or X, Signal Cancellation Lever will move in the direction of the arrow mark, and (a) will push and move Mirror Lock Lever (b) in the direction of the arrow mark.
Then the engagement (d) will be released, and Mirror Holder will come down. (Fig. 2) (Refer to Electric Shutter System.)

D. On-Off System of SW 5

The movement of Connection Plate in the direction of the arrow mark will enable Mirror Operation Lever to move in the direction of the arrow mark, (a) will also move Auxiliary Brake in the same direction, and both SW5 and Magnet will be turned on. Immediately before the completion of the lowering of Mirror Holder, Mirror Operation Lever (a) will move Auxiliary Brake in the opposite direction to the arrow mark, and both SW5 and Magnet will be turned off. (Fig. 3) (Refer to SW.)

Fig-1

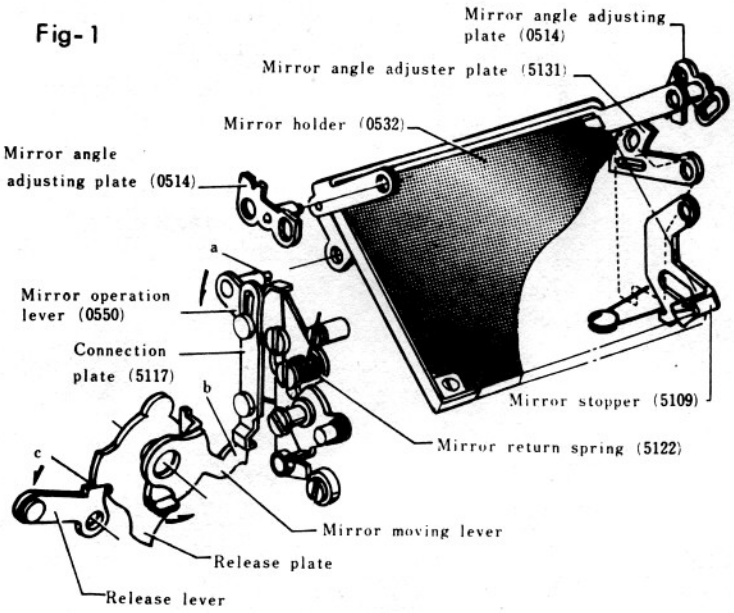


Fig-2

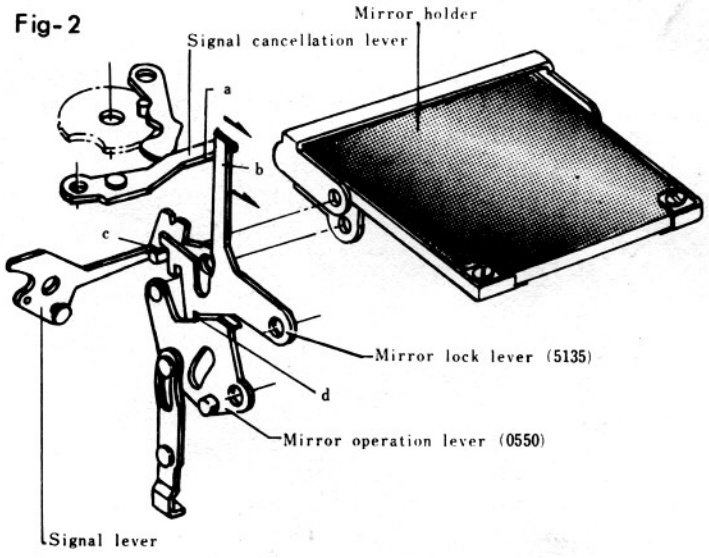
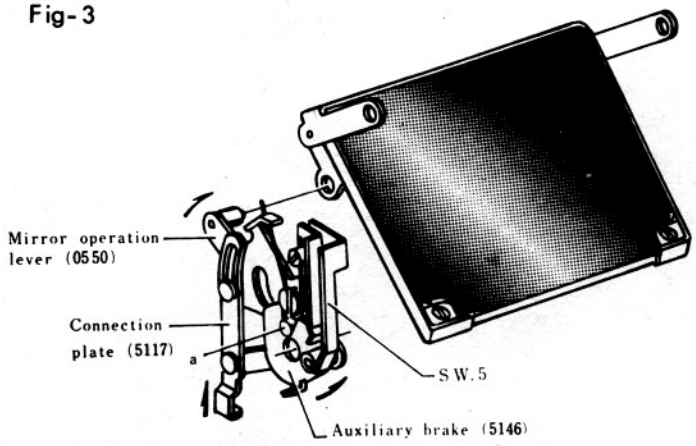


Fig-3



E. Automatic Diaphragm and Return System

When Connection Plate begins to move in the direction of the arrow mark, Return Lever will move in the same direction via MP Moving Lever. P Lever Adjuster Pin will move Preset Lever in that direction, too, via P Connection Plate. Then Lens Side Preset will be freed, and the lens will be set to the prescribed aperture.
The movement of Return Lever in the direction of the arrow mark will be retarded by P Brake Lever, Wheel G and Fly Wheel, and the aperture of the auto preser lens will be stabilized.
When Last Blade closes following the operation of the shutter, Return Lever will move in the opposite direction to the arrow mark and shift Preset Lever in the same direction via P Connection Plate and P Lever Adjuster Pin. Then Lens Side Preset will be pushed back, and the diaphragm will be opened.

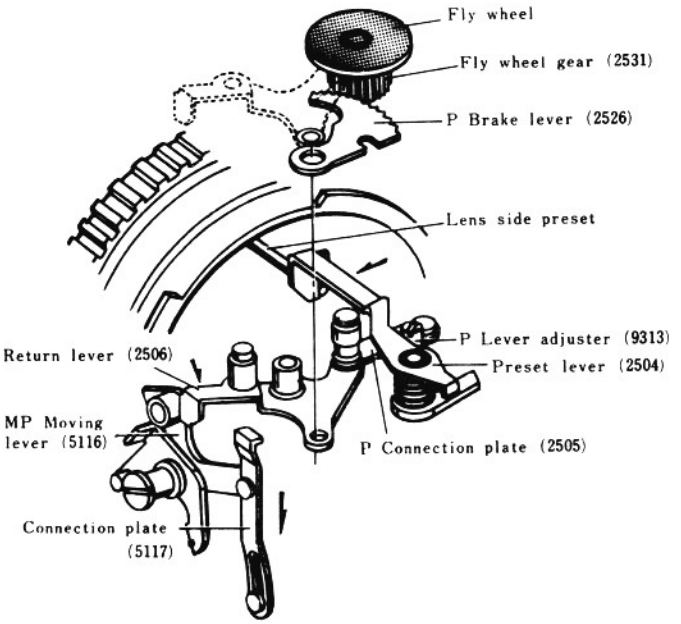
F. On-Off System of SW 2, SW 3 and SW 4

The movement of Return Lever in the direction of the arrow mark will shift SW' Change Lever in the direction of the arrow mark via Change Lever Pin A. Then SW 2 and SW 3 will be turned off, while SW 4 will be turned on. When Return Lever is released following the operation of the shutter, SW 2 and SW 3 will be turned on, while SW 4 will be turned off.

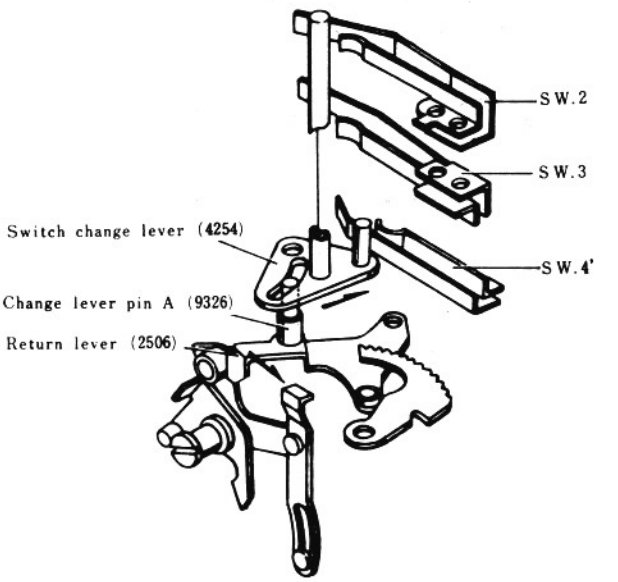
G. Diaphragm and On-Off System of PV SW

When Preview Button is pressed, the open light measurement will become possible. When the button is pressed further, Lens Opening Retention Lever will move in the direction of the arrow mark. The suspension of Diaphragm Plate Axis B will be released, and Diaphragm Plate will move in the direction of the arrow mark and shift Prest Lever in the same direction via Diaphragm Pin, and light can be measured through the diaphragm.
The movement of Diaphragm Plate will enable P Lock Lever to move in the direction of the arrow mark. Preset Second Lever will be suspended, and the operation of the mirror will be retarded when an aperture is set.
When light is measured through the diaphragm, Preview Button will remain unpressed. When it is pressed, Lens Opening Retention Lever will be suspended by Diaphragm Plate Axis B. P Lock Lever will mover will move in the direction of the arrow mark, and the suspension of Present Second Lever will be released, Preset Lever will move in the direction of the arrow mark, and the open light measurement will become possible.
The movement of Diaphragm Plate will turn PV SW on and off. PV SW will be turned on f for the open light measurement and will be turned off for the light measurement through the diaphragm. (Refer to SW.)

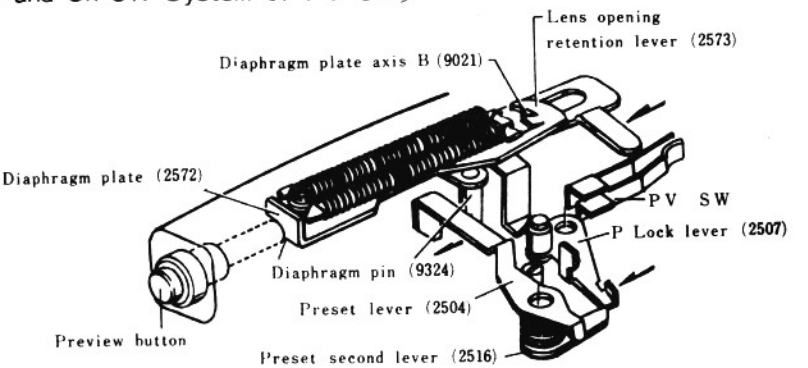
〔Automatic Diaphragm and Return System〕

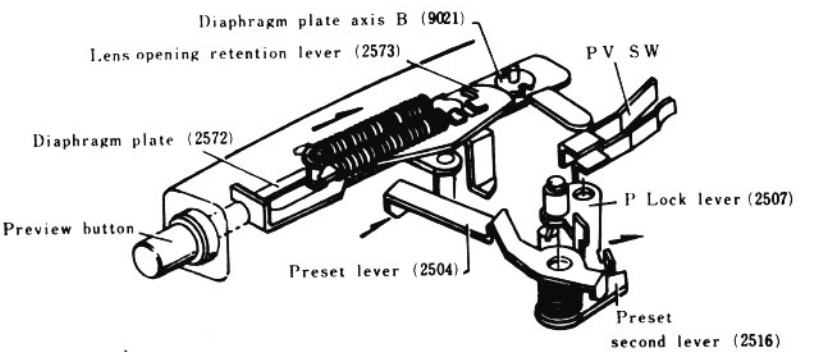


〔On-Off System of SW 2, SW 3 and SW 4〕



〔Diaphragm and On-Off System of PV SW〕



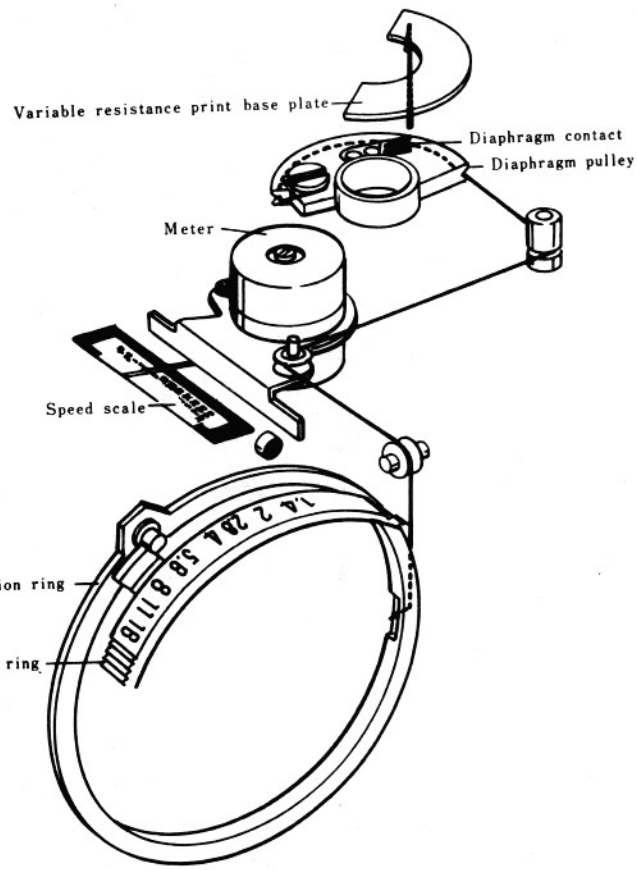


8. Exposure Interlocking System

When an aperture figure of Diaphragm Ring is set, Diaphragm Contact (4105) will get in touch with Diaphragm Resistor (4118) via Diaphragm Pulley (0211). Then a resistance figure corresponding to the set aperture figure will be set, and it plus the resistance figure on the ASA side will be transmitted to the circuit side as the exposure factor.

Note: Diaphragm SW will be turned on only for the open light measurement.

9. Optical Layout

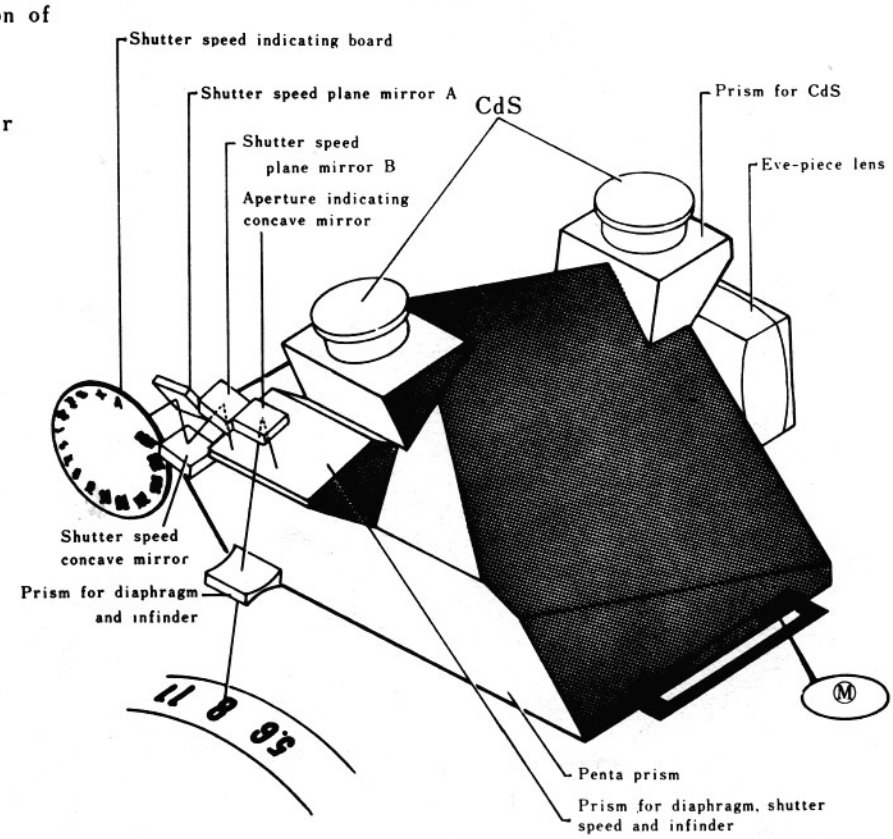


1. Indication of Shutter Speed

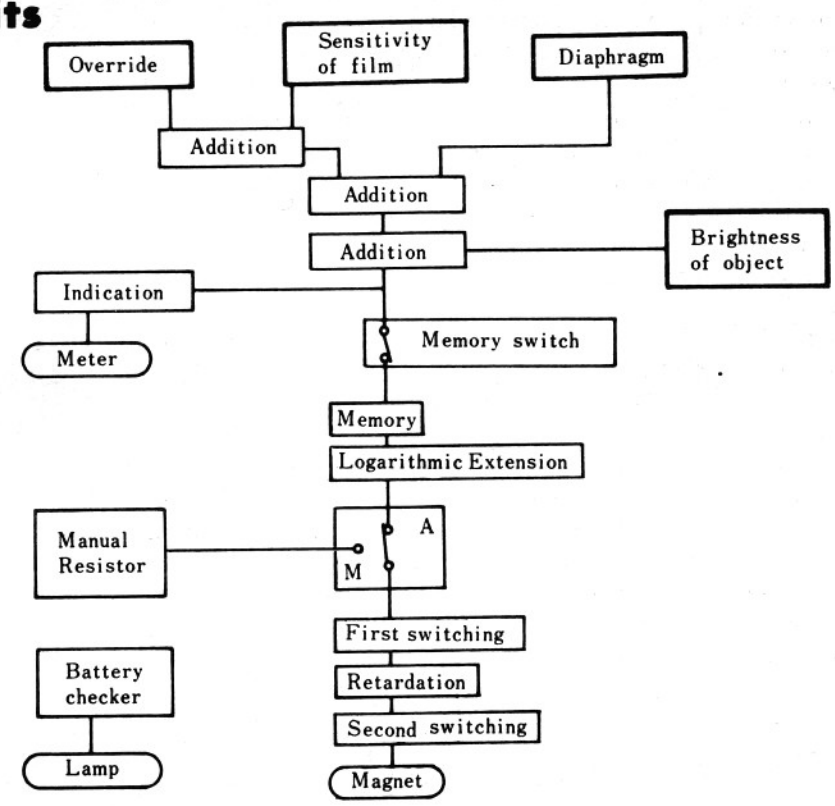
Shutter Speed Indicating Board
↓
Shutter Speed Plane Mirror A
↓
Shutter Speed Concave Mirror
↓
Shutter Speed Plane Mirror B
↓
Prism for Diaphragm, Shutter Speed and Infinder
↓
Penta Prism
↓
Eye-Piece Lens

2. Indication of Aperture Figure

Diaphragm Ring
↓
Prism for Diaphragm and Infinder
↓
Concave Mirror for Indication of Aperture Figure
↓
Prism for Diaphragm, Shutter Speed and Infinder
↓
Penta Prism
↓
Eye-Piece Lens



10. Explanation of Light Measuring Principle and Circuits



A. Summary

● Light Measuring Systems

The measurement of light is roughly divided into 2 systems-the TTL light measuring system as represented by X-1 (XM and XK) and the outer light measuring system by Hi-MATIC E. In the case of the TTL measuring system, automatic exposure is possible only with the time set circuit comprising the CdS and the condenser and with the switching circuit. The reason is that the resistance value does not change or block light to the CdS.
In the case of a single reflex camera of the TTL measuring system, its circuits, if constructed like those of the outer light measuring system, won't be able to achieve automatic exposure, because its operation (automatic aperture setting and mirror operation) will change or block light to the CdS. Therefore, it is necessary to memorize the results of the TTL measurement immediately before the release of the shutter so that the effects of the automatic aperture setting and the mirror operation may be prevented.

● Memory Systems

A variety of memory systems are conceivable. A system of charging the condenser with the results of the light measurement and memorizing the charged voltage is adopted for XE as well as for X-1.
In addition to this memory system, XE has a more complicated construction and needs more accurate components and adjustments than cameras with lens shutters of the electronic control type such as Hi-MATIC E and F, because it has wide ranges of the light measurement and the film sensitivity, and because it requires the interchangeability of various lenses and attachments.

● Automatic Exposure Control Systems

The automatic exposure control system for XE will be explained according to the block diagram.

a. Light Measuring System

The automatic exposure control system for XE is the same as that for E-1. It is designed to obtain adequate exposure by setting the ASA number, the aperture figure and the exposure correcting figure and by automatically determining the exposure time on the basis of these figures and the brightness of the object. First, it will mechanically add the ASA number

in which the rotary angle per step is logarithmically compressed at a certain constant (graduations at equal intervals). and the exposure correcting figure, will add these figures to the aperture which is logarithmically compressed as well as the ASA number, figure, via the metal-covered resistor, and at the same time, will convert the sum into an electric volume (voltage).
The electric value (voltage) will be added to another electric volume (voltage) in which the brightness of the object is logarithmically compressed by the photoelectric converting part (C part of the circuit) made up of 2 CdS and several resistors. The sum will be equivalent to the exposure time, and will be charged to (memorized by) the condenser (C_1 of the E part of the circuit). On the other hand, the exposure time will be indicated in the finder by the meter via the indication circuit.

b. Control System
Next, when released, the light measuring output point and the condenser (C_1) will be saparated from each other by the memory switch (D part of the circuit diagram), and the measured light quantity (voltage corresponding to the exposure time) immediately before the release will be memorized.
Light to the CdS will be converted by the automatic diaphragm and the mirror operation. Even when the light measuring output voltage may change because of the blocking of light, the charged voltage of the memory condenser (C_1) won't be affected and the memory will be accurately kept. When the operation of the camera advances further, the first curtain will begin to run, the relative trigger switch will work, and the memorized quantity (logarithmically compressed quantity) will be converted into a logarithmically extended current. Then the current will be charged to the condenser (C_2). When the voltage reaches a certain level, the first switching circuit (F of the circuit diagram) and the delay circuit (I of the current diagram) will work one after another. After a certain length of time, the second switching circuit (J of the circuit diagram) will work, the current of the magnet (K of the circuit diagram) will be cut off, and the second curtain will run. Thus the exposure will be completed.

• Manual Time

In the case of the manual time, the memory will be switched from the logarithmic extension circuit (F of the circuit diagram) to the manual resistor (G of the circuit diagram) in order to form the CR time set circuit. Then the exposure will be controlled in the same way as the automatic control system.
Note: Exposure correction means an increase or decrease of a certain figure (up to 2Ev) to or from the standard exposure in the case of automatic photography. For example, a "+1" exposure correction means to add 1Ev to the standard exposure.

B. Logarithmic Compression and Addition

• Logarithmic Compression

Logarithmic compression is necessary to determine the adequate exposure. Variations are usually given in the manner of geometric progression to those in the ASA number, the aperture figure, the exposure time, etc. (For example, 2Ev, 4Ev · · · are given to 1Ev, 2Ev · · ·, respectively; 25, 50, 100, 200 · · · for the film sensitivity figure; and 1 sec., 1/2 sec., 1/4 sec · · · for the exposure time.) Since the power source needs a high voltage to convert such figures that will change in the manner of geometric progression, no camera can practically afford to have so high a voltage. Then it becomes necessary to convert variations in the Ev figure to those given in the manner of arithmetical progression (for example, 1Ev, 2Ev, 3Ev · · · to 1, 2, 3 · · ·). This sort of conversion means logarithmic compression.

〔Example〕 If the exposure time of 1~1/1000 sec. is converted into a voltage at the rate of 0.1V per second without giving logarithmic compression, 1/1000 sec. will be: $0.1V \times 2^{10} = 102.4V$. If, however, 1/1000 sec. is logarithmically compressed, the obtained figure will be: $0.1V \times 10 = 1V$, or less than 1/100 of the 102.4V. This small figure is quite practical for cameras.

An explanation will be given about how the following factors can be logarithmically compressed:

a. Film Sensitivity, Exposure Correction and Aperture Figures

As mentioned before, the ASA number changes in the way of 25, 50, 100, 200 · · · When the set dial is graduated at equal intervals (rotary angle per step), the rotary angle of the dial will respond to the shift of the brush of the metal-covered resistor with a linear property (A and B of the circuit diagram), and these figures will be converted to resistance values (voltages) which change in the manner of arithmetical progression. Similar methods are used for the exposure correction figure and the aperture figure.

b. Brightness of Object

As apparent from the circuit diagram shown later, in the photoelectric conversion circuit (C of the circuit diagram) comprising 2 CdS and several resistors, the brightness of the object will be electrically converted and logarithmically compressed thanks to the special property of these CdS and the special construction of the circuits. No diode or transistor is used for logarithmic compression.

c. Exposure Time

The exposure time will be memorized as the logarithmically compressed output of the light measuring circuit by adding the before-mentioned factors in the manner of logarithmic compression.

• Addition

As stated previously, all factors in determining the adequate exposure are added in the manner of logarithmic compression. First, the ASA number and the exposure correction figure will be mechanically obtained.

Then they will be added to the aperture figure and the total will be electrically converted simultaneously via the metal-covered resistor (A and B of the circuit diagram).

Further, the addition of the total to the brightness of the object will be electrically made in a circuit with IC-B as the nucleus. This sort of mechanical adding system is called the adding system, while that of electrical adding system is called the addition circuit.

C. Memory

Since light is measured after its passage through the take lens, its reflection on the mirror, and its passage through the focus plate, light to the CdS is changed or blocked by the automatic diaphragm and the mirror operation. Therefore, it is necessary to withhold the light value measured immediately before the release operation in connection with the operation itself. The memory means to withhold the measured value.

In the case of XE, the condenser C_1 (E of the circuit diagram) will be charged. The memory switch (D of the circuit diagram) will open along with the release operation, and the charged voltage will be withheld (memorized). This sort of circuit is called the memory circuit.

D. Logarithmic Extension

As mentioned before, the electric volume (voltage) corresponding to the exposure time is memorized in the form of a logarithmically compressed figure. Therefore, the volume must be converted into an adequate exposure time (1, 1/2, 1/4 sec. or else). This sort of conversion is called logarithmic extension (or simply extension). In the case of XE, the memorized voltage will be converted into a current in the manner of logarithmic extension by utilizing the special property of the transistor (F of the circuit diagram). The condenser C_2 constituting the time set circuit will be charged with the logarithmically extended current, and the control of the magnet will convert the current into the required exposure time via the subsequent switching circuits.

E. First Switching, Delay and Second Switching Circuits

Generally speaking, the adequate exposure time cannot be easily obtained for the focal pressure shutter simply by electrically controlling the time (1 ms in the case of 1/1000 sec.) corresponding to the exposure time, because there is an overlap between the first and the second curtains. Therefore, the circuit construction is in the operational order of the first switching circuit, the delay circuit and the second switching circuit.
In conjunction with the logarithmically extended part (E of the circuit diagram) and the time set circuit comprising the condenser C_2 or the manual resistor (G of the circuit diagram) plus the condenser C_2, the first switching circuit (H of the circuit diagram) will control the time (1 ms in the case of 1/1000 sec.) equal to the exposure time. The combination of the delay circuit (I of the circuit diagram) with the second switching circuit (J of the circuit diagram) will delay a certain length of time (constant irrespective of the exposure time) equivalent to the "zero" time of the overlap between the two curtains, and will obtain the exposure time by controlling the magnet. This delay action is mechanically possible by making the operation of the trigger switch well timed, but is much easier by an electric method. This is the reason why the electric delay circuit is used as shown in the circuit diagram.

F. Indication Circuit and Meter

The indication circuit is intended to amplify the output of the addition circuit and to operate the meter inside the finder.

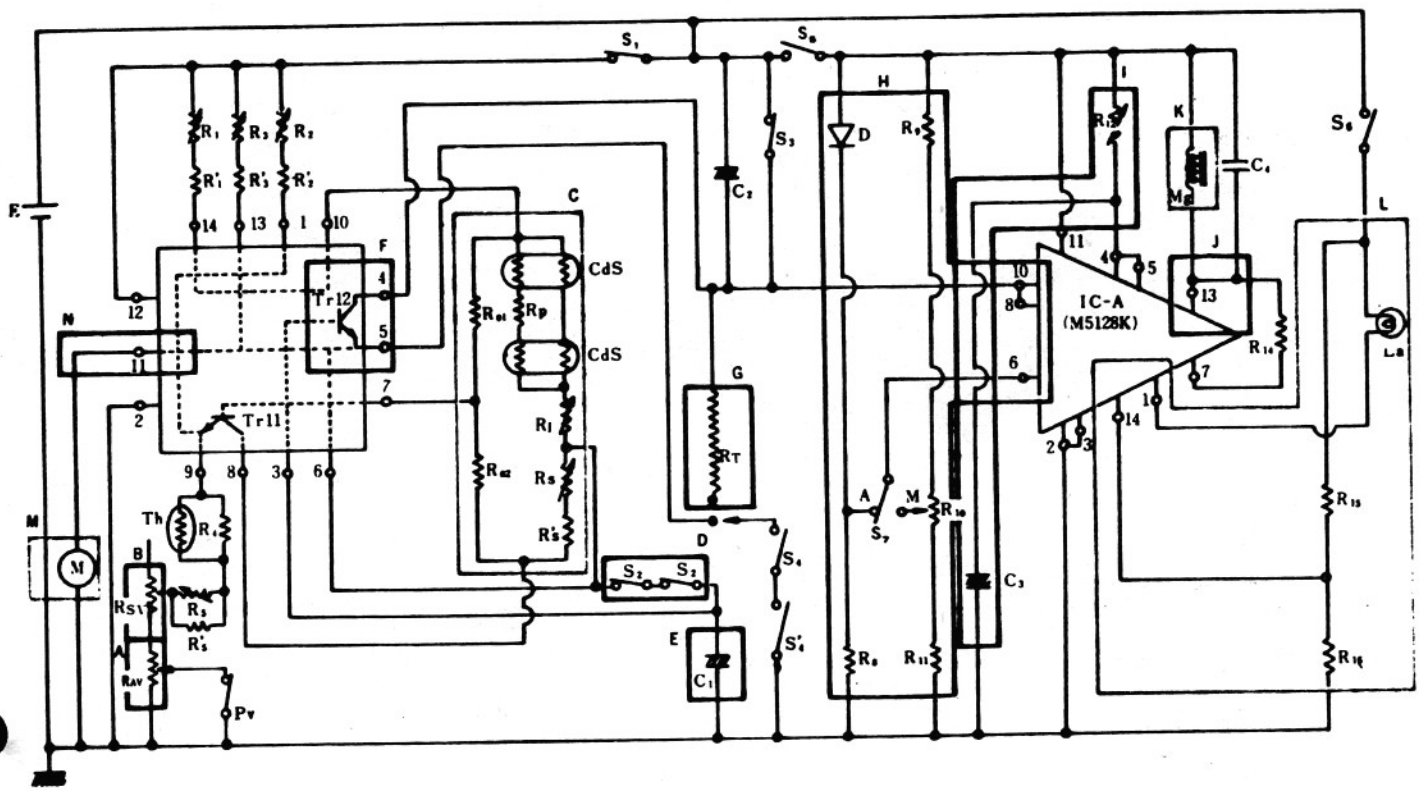
G. Manual Resistor

In the case of automatic exposure, the first switching circuit will be controlled by a signal received from the extension circuit. In the case of manual exposure, however, it is connected with the CR time set circuit. In this case, a resistance value (1/1000 sec. is small and 4 sec. are large) equivalent to a certain exposure time (shutter speed) will be set to the condenser C.

H. Battery Check Circuit

The battery check circuit is intended to check the voltage of the power source. The lamp will light within the range (voltage) of the accurate control of the exposure time. The consumed current is the same as what is consumed for the operation of the camera. The lamp will light up to about 2.0V.

11. Circuit Diagram and Properties of Switches



A: Aperture Figure
B: ASA Number and Exposure Correction Figure
C: Brightness of Object
D: Memory Switch
E: Memory Condenser
F: Extension
G: Manual Resistor
H: First Switching
I : Delay
J: Second Switching
K: Magnet
L: Battery Checker
M: Meter
N: Indication

C_1 : Memory Condenser (2.2μF)
C_2 : Condenser (1.0μF) for CR Time
C_3 : Condenser (0.1μF) for Delay Circuit
C_4 : Condenser (0.05μF) for Prevention of Reverse Generation of Magnet
D : Diode for Setting Trigger Level upon Automatic Exposure
La : Checker Lamp

R_{10} : Semi-Fixed Resistor (68KΩ) for Setting Trigger Level upon Manual Exposure
R_{15} : Resistor (1KΩ) for Battery Checker
R_{16} : 〃 (630Ω) 〃
R_{12} : Semi-Fixed Resistor (40KΩ) for Delay

Mark	Name	Operation	Operating Condition	Before Release	During Exposure	After Exposure
S_1	Main Switch	The liht measuring operation starts when automatic light the measuring circuit is turned on. The meter indicates the shutter time. (The A base plate circuit is turned on.)	(Interlocked with the main switch.)	(ON)	(ON)	(ON)
S_2	Memory Switch	S_2 will keep the memory even after S'_2 returns.	To return immediately after the completion of the exposure. (Interloched with the mirror operation lever.)	ON	OFF	ON
S'_2	Memory Second Switch	This switch will be turned off immediately before the release of the shutter. Then the logarithmically compressed light value (Tv = Sv+Bv−Av) will be memorized by the memory condenser before variations in the light value to be caused by the lifting of the mirror.	To be turned off immediately before the release of the shutter. (Interlocked with the shutter release axis.)	ON	OFF	ON
S_3	Condenser Dischaarge Switch	This switch will enable the condenser to discharge its electric load for both the manual and automatic operations.	The operation interval between $S_3$and S_4 should be stable. (Interloked with the mirror operation lever.)	ON	OFF	ON
S'_4	Second Switch for Start of Control of Exposure Time.		To be turned on before S_4 (Interlocked with the mirror operation lever.)	OFF	ON	OFF
S_4	Switch (Trigger Switch) for Start of Control of Exposure Time	This switch will start counting the exposure time for both the manual and automatic operations.	Chattering should be eliminated because it has adverse effects on the stability of the shutter speed. Even if chattering cannot be eliminated, the shutter speed should remain stable. (Shuuter block)	OFF	ON	OFF (Completion of the film advance.)
S_5	Switch for Start of Attraction of Magnet	This switch will make the magnet attractive. (The B base plate circuit is turned on.)	To minimize chattering as much as possible. (Interlocked with the mirror operation lever.)	OFF	ON	OFF
S_6	Battery Checker Switch	This switch will check the battery.	(Interlocked with the battery checker lever.)	No relations		
S_7	AM (Automatic and manual exposure) select Switch	This switch will change circuits for the automatic or the manual exposure.	(Interlocked with the shutter dial.)			
Pv	Pre-View Switch	This switch will prevent an erroneous exposure operation upon the open lighe-measurement or the measurement through the diaphragm.				
FP	Switch for Ignition of Flash	This switch will ignite the flash.	To be turned on 11-15ms before the run of the first curtain, and to be turned off upon the completion of the run of the second curtain.	OFF	ON	OFF
X	Switch for Ignition of Stroboscope	This switch will ignite the stroboscope.	To be turned on upon the completion of the run of the first curtain and to be turned off upon the completion of the run of the second curtain.	OFF	ON	OFF

12. Explanation of Circuits

A. Control Circuit

When the main switch (S_1) is turned on, the addition and the indication circuits will work, and the meter's pointer will swing.

A constant current of 25μA usually flows through the addition circuit. The bridge circuit comprising the light receiving element (CdS) and resistors (R_{01}, R_{02}, Rs, Rs′ and R_1) obtains an output of 18mV per Ev.

The current of 25μA will be adjusted by R_1, the common terminal of the CdS (on the lens side) will be opened (removed), and a decrease in the voltage of R_{02} will be measured.

That is to say: $25(\mu A)\times 15.5(K\Omega)=25\times 10^{-6}\times 15.5\times 10^{3}$

$=387.5\times 10^{-3}$

$=387.5mV$

The constant current of 25μA will pass through Tr 11 via the CdS circuit and join another constant current of 8μA coming from R_2. Then the two (25μA +8μA=33μA) will flow to the earth via ASA (Rsv) and the diaphragm resistor (R_{AV}).

At a resistance value of about 540Ω per Ev, the slide resistors (Rsv+R_{AV}) will become:

$540\Omega\times 33\mu A=540\times 33\times 10^{-6}$

$\fallingdotseq 18\times 10^{-3}(V)$

$\fallingdotseq 18mV$

Then they will transmit information on the ASA and the aperture to the addition circuit.

R_{AV} and R_{SV} cause a problem because of a difference in their properties. For example, the 8-step conversion volume of R_{AV} will be: $540\ \Omega)\times 8\times 33(\mu A)=540\times 8\times 33\times 10^{-6}\fallingdotseq 143\times 10^{-3}(V)$ $=143(mV)$ However, the 7% difference in its property will cause an error: $143mV\times 0.07\fallingdotseq 10(mV)$ $10/18\fallingdotseq 0.5Ev$. Therefore, a constant current of 8μA will be corrected by R_2 and the output will be stabilized.

The output obtained in the addition circuit can be obtained from the midcontact point between R_1 and Rs in the CdS circuit.

The memory switches (S_2 and S_2'), when turned on, will charge the memory condenser (C_1) with the output of the addition circuit.

When the shutter is released, each switch will work as shown in Table 1. When S_2' is turned off, C_1 will be separated from the addition circuit and memorize the given information.

When the shutter button is further pressed, the mirror moving system will work, S_5 will be turned on to activate the first switching, the delay and the second switching circuits, the magnet will be energized, and the second curtain will be suspended.

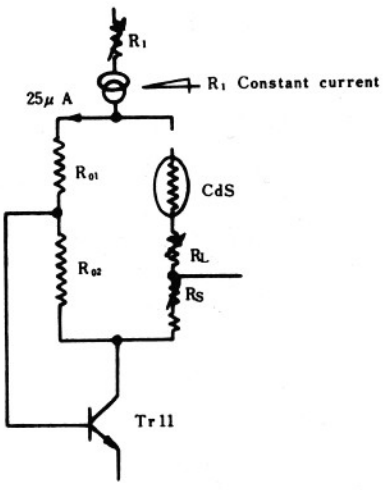


Table-1

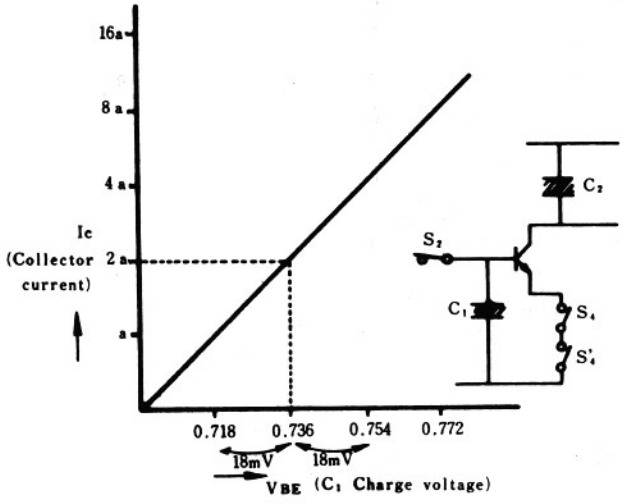
Film advance completed	S_1 ON, S_2 ON, S_2' ON, S_4' OFF, S_3 ON, S_4 OFF, S_5 OFF
Release starts	
Memory	S_2' OFF
Mirror operation starts	
Magnet ON	S_5 ON
	S_4' ON
	S_2, S_3 OFF
	S_4 ON
First curtain runs	
↓	
Second curtain runs	
Mirror down	
	S_2 ON, S_3 ON
	S_4' OFF
	S_5 OFF
Shutter button returns	S_2' ON
Film advance completed	

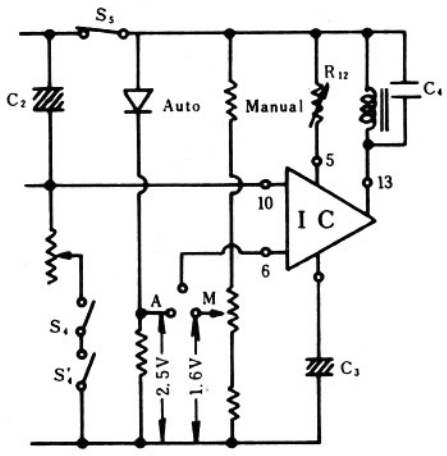
The movement of the shutter mech. block will turn on S_4 (trigger switch) in connection with the run of the first curtain, and C_2 will start charging via the extension circuit.
On this occasion, the current will flow through the plus electrode, C_2, Tr for extension, S_4, S'_4 and the minus electrode. The arithmetically compressed voltage against the brightness of theobject, which was charged to C_1, will be converted in the manner of geometrical progression.
No. 10 and No. 6 terminals of the IC constitute the differential amplifying circuit (first switching circuit) in the IC. No. 6 terminal (trigger level) will be usually stabilized at about 1.6V for the manual operation and at about 2.5V for the automatic operation.
When S_4 is turned on, the voltage of No. 10 terminal will decline because C_2 is charged with the 3V of the power source and will reach the same value as the trigger level of No. 6 terminal. Then the differential amplifying circuit will turn reversely.
With the reverse turn of the first switching circuit, the delay circuit (C_3) will be charged via R_{12}. When the charged voltage becomes a half of the voltage of the power source, the second switching circuit will turn reversely. Then the current of the magnet connected to No. 13 terminal will be blocked, and the second curtain will run.
For the manual release of the shutter, the Rt tip resistance will arise from the extension circuit by operating the A-M select switch, and the CR time set circuit will be made up of C_2 and R_T. However, the circuit operation will be the same as that for the automatic release of the shutter.

B. Meter Circuit

The meter circuit is designed to amplify the output of the addition circuit and to operate the meter. It is contained in the IC for the light measurement and the memory circuits.
Its output is the memory voltage of No. 6 terminal and its imput is the voltage of No. 11 terminal. The swinging volume of the ammeter with an internal resistance of 1.2KΩ varies depending on the combination of IC, CdS, etc., but will be adjusted by R_2.

Table-2





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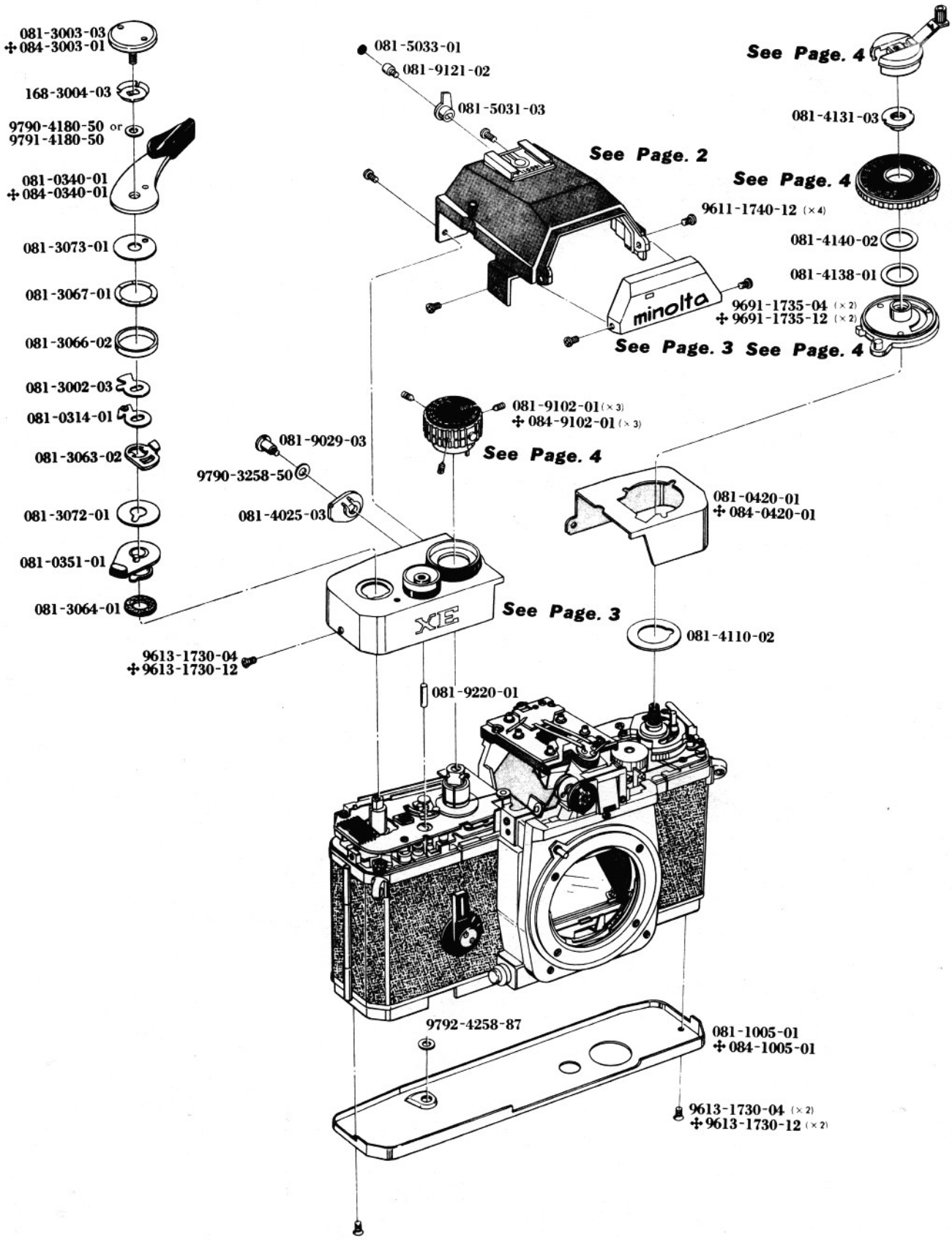
XE (081·084)
XE-1 (082·085)
XE-7 (086)

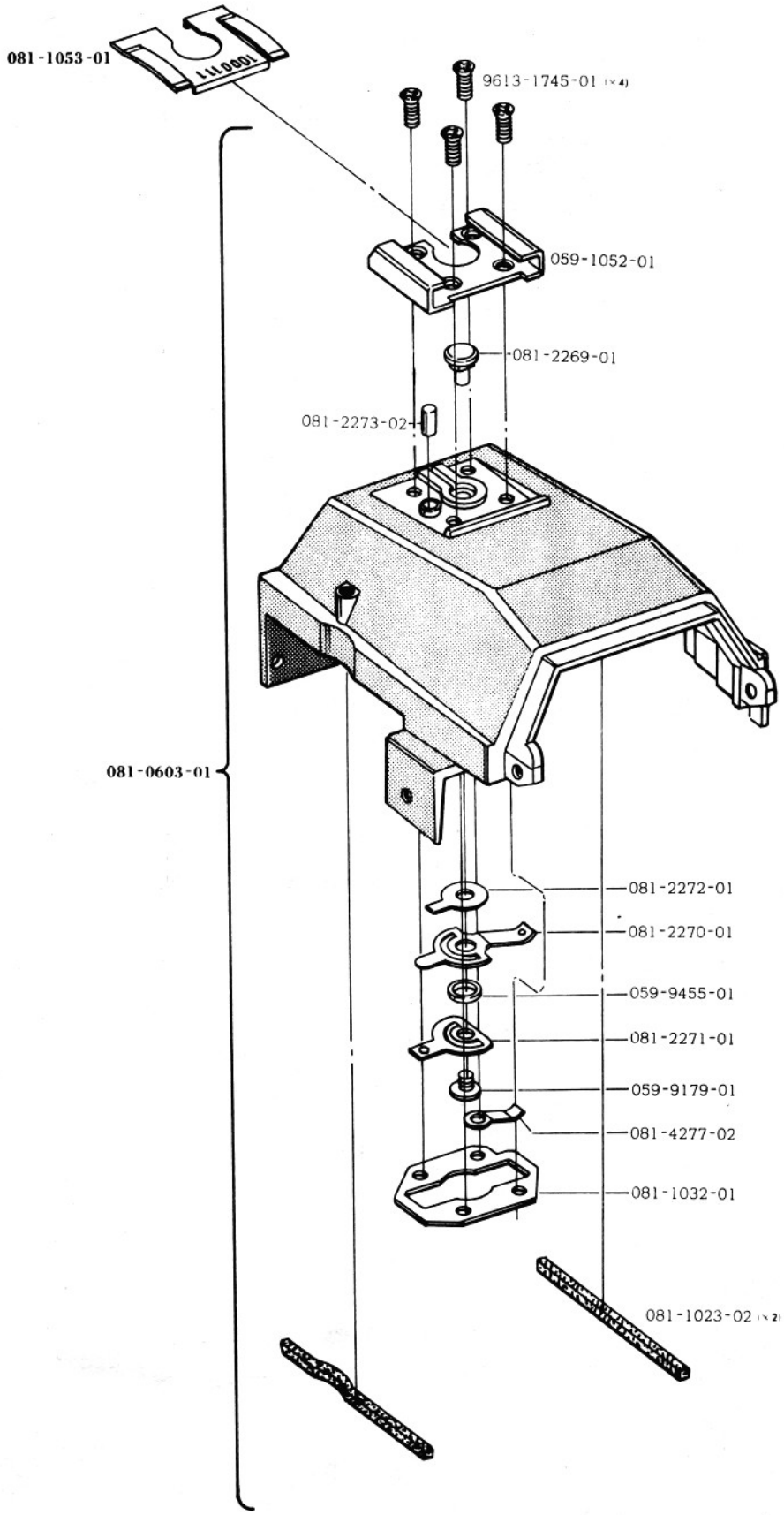


Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0314-01	Multiple exposure rewind plate set 多重露出戻し板セット	1
081-0340-01	Film advance lever set 巻上レバーセット	1
081-0351-01	Multiple exposure lever set 多重露出レバーセット	1
081-0420-01	Top cover set (Left) 上カバーセット(左)	1
081-1005-01	Bottom cover 下カバー	1
081-3002-03	Film advance lever coupling washer 巻上げレバー結合子	1
081-3003-03	Film advance lever pressure 巻上げレバー押え	1
168-3004-03	Film advance lever spring washer 巻上げレバースプリングワッシャー	1
081-3063-02	Stop plate ストップ板	1
081-3064-01	Top cover packing 上カバー防塵パッキン	1
081-3066-02	Film advance lever decoration ring 巻上げレバー飾り環	1
081-3067-01	Decoration ring pressure plate 飾り環押え板	1
081-3072-01	Silencer seat 防音シート	1
081-3073-01	Film advance lever washer 巻上げレバーワッシャー	1
081-4025-03	Power switch lever メインスイッチレバー	1
081-4110-02	Packing plate 防塵板	1
081-4131-03	Top cover pressure nut 上カバー押えナット	1
081-4138-01	ASA operation knob adjust washer ASA操作ノブ調整ワッシャー	調整用
081-4140-02	ASA operation knob washer ASA操作ノブワッシャー	1
081-5031-03	Change lever 切換レバー	1
081-5033-01	Change lever leather 切換レバー貼皮	1
081-9029-03	Power switch lever axis メインスイッチレバー軸	1
081-9102-01	Shutter dial set screw シャッターダイヤル止めビス	3
081-9121-02	Change lever screw 切換レバービス	1
081-9220-01	Shutter button axis シャッター釦芯	1
9611-1740-12	Phillips type screw 十字穴付なべ頭小ねじ	4
9613-1730-04	Phillips type screw 十字穴付皿小ねじ	3
9691-1735-04	Phillips type tapping screw 十字穴付なべ頭タッピンねじ	2
9790-3258-50	Adjustment washer 薄ワッシャー	調整用
9790-4180-50	Adjustment washer 薄ワッシャー	調整用
9791-4180-50	Adjustment washer 薄ワッシャー	調整用
9792-4258-87	Washer 薄ワッシャー	1

Black body parts

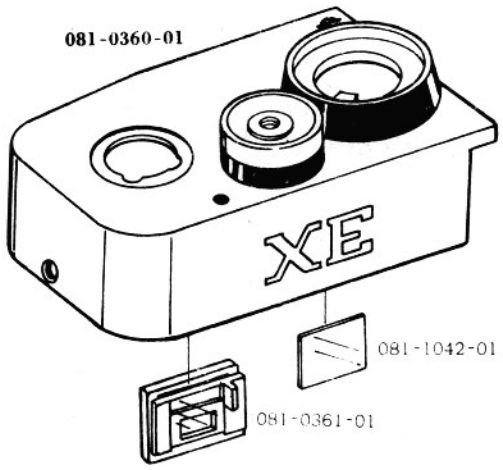
084-0340-01	Film advance lever set 巻上げレバーセット	1
084-0420-01	Top cover set (Left) 上カバーセット(左)	1
084-1005-01	Bottom cover 下カバー	1
084-3003-01	Film advance lever pressure 巻上げレバー押え	1
084-9102-01	Shutter dial set screw シャッターダイヤル止めビス	3
9613-1730-12	Phillips type screw 十字穴付皿頭小ねじ	3
9691-1735-12	Phillips type tapping screw 十字穴付なべ頭タッピンねじ	2

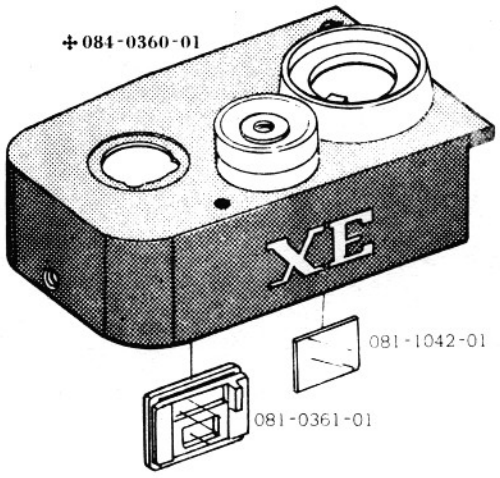
XE (081·084)
XE-1 (082·085)
XE-7 (086)

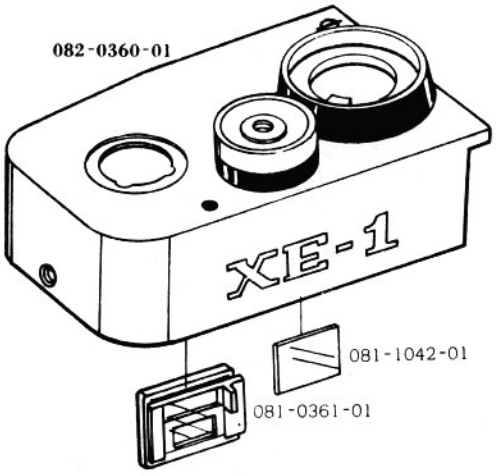


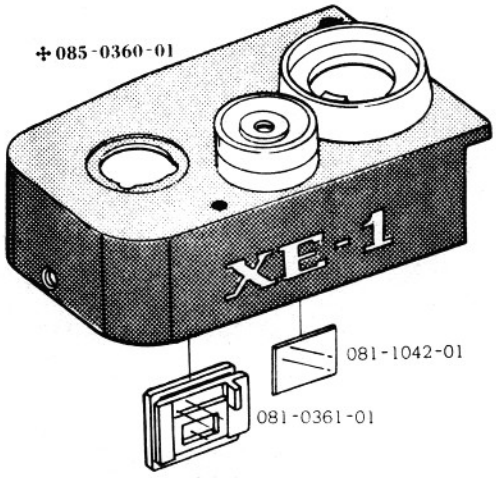
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0603-01	Penta. prism cover set　ペンタカバーセット	1
081-1023-02	Top cover packing　上カバー用ごみ防止パッキン	2
081-1032-01	Accessory shoe set plate　アクセサリーシュー取付板	1
059-1052-01	Accessory shoe　アクセサリーシュー	1
081-2269-01	Hot shoe contact　ダイレクト接点	1
081-2270-01	Accessory shoe contact-A　コンタクト接片A	1
081-2271-01	Accessory shoe contact-B　コンタクト接片B	1
081-2272-01	Accessory shoe isolation plate　コンタクト絶縁板	1
081-2273-02	Accessory shoe contact pin　コンタクト接点連動ピン	1
081-4277-02	Direct shoe earth contact　ダイレクトコンタクトシューアース接片	1
059-9179-01	Accessory shoe pressure screw　コンタクト接片押えビス	1
059-9455-01	Accessory shoe isolation collar　コンタクト接片絶縁カラー	1
9613-1745-01	Phillips type screw　十字穴付皿頭小ねじ	4
081-1053-01	Accessory shoe spring　アクセサリシューばね	1

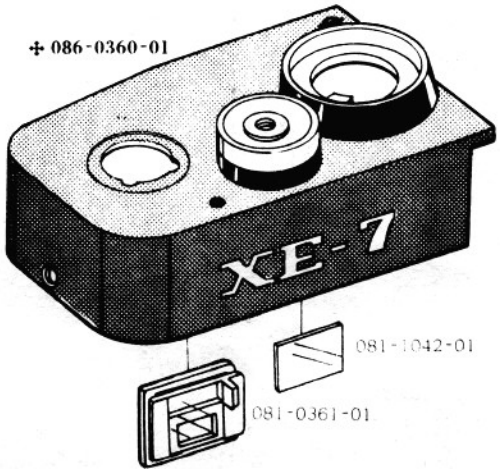
XE (081·084)
XE-I (082·085)
XE-7 (086)

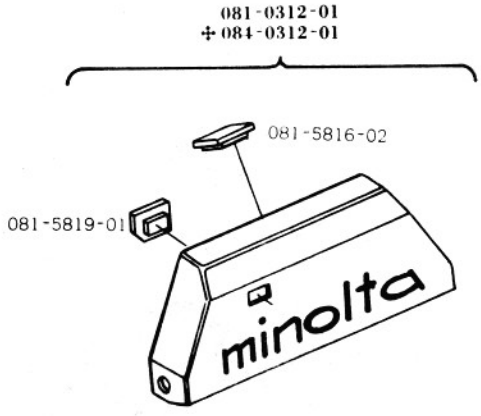










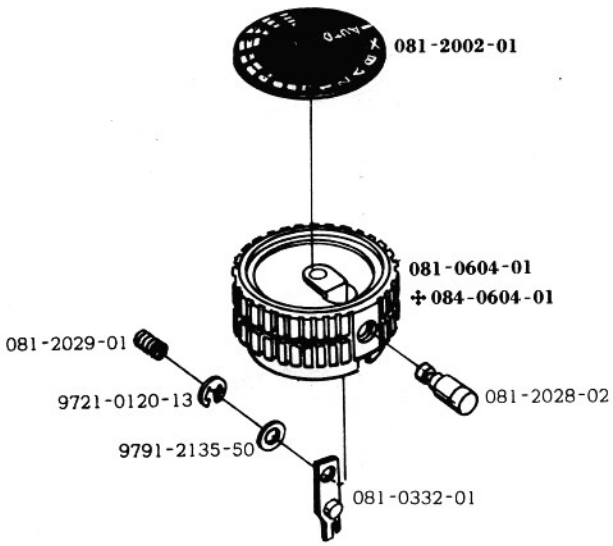


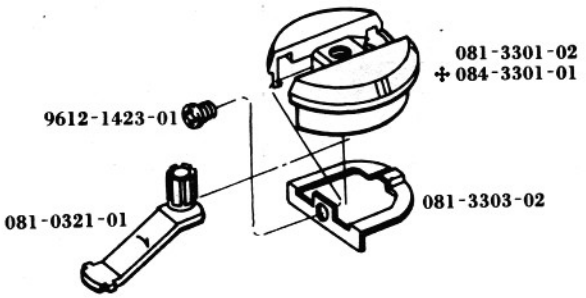
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0312-01	Name plate set　銘板セット	1
081-5816-02	Diaphragm value in-finder window　絞りインファインダー窓	1
081-5819-01	Shutter speed light window　ＳＳ照明窓	1
081-0360-01	XE Top cover set (Right)　ＸＥ上カバーセット（右）	1
081-0361-01	Counter window set　カウンター窓枠セット	1
081-1042-01	Top cover tape　上カバー保護テープ	1
082-0360-01	XE-1 Top cover set (Right)　ＸＥ-１上カバーセット（右）	1
081-0361-01	Counter window set　カウンター窓枠セット	1
081-1042-01	Top cover tape　上カバー保護テープ	1

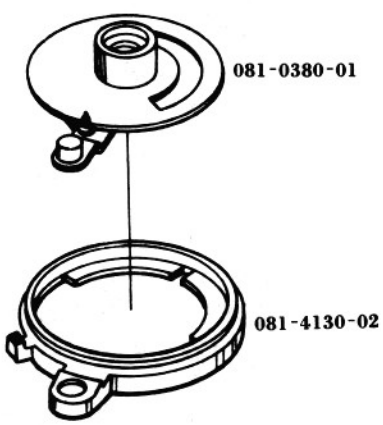
Black body parts

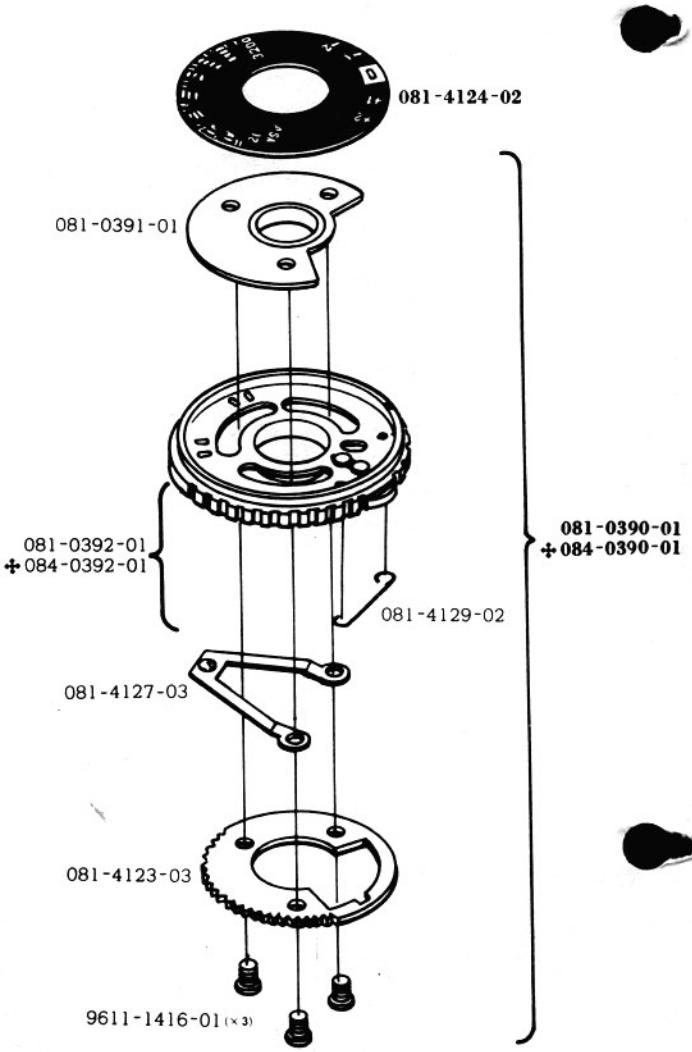
084-0312-01	Name plate set　銘板セット	1
081-5816-02	Diaphragm valve in-finder window　絞りインファインダー窓	1
081-5819-01	Shutter speed light window　ＳＳ照明窓	1
084-0360-01	XE Top cover set (Right)　ＸＥ上カバーセット（右）	1
081-0361-01	Counter window set　カウンター窓枠セット	1
081-1042-01	Top cover tape　上カバー保護テープ	1
085-0360-01	XE-1 Top cover set (Right)　ＸＥ-１上カバーセット（右）	1
081-0361-01	Counter window set　カウンター窓枠セット	1
081-1042-01	Top cover tape　上カバー保護テープ	1
086-0360-01	XE-7 Top cover set (Right)　ＸＥ-７上カバーセット（右）	1
081-0361-01	Counter window set　カウンター窓枠セット	1
081-1042-01	Top cover tape　上カバー保護テープ	1

XE (081·084)
XE-I (082·085)
XE-7 (086)







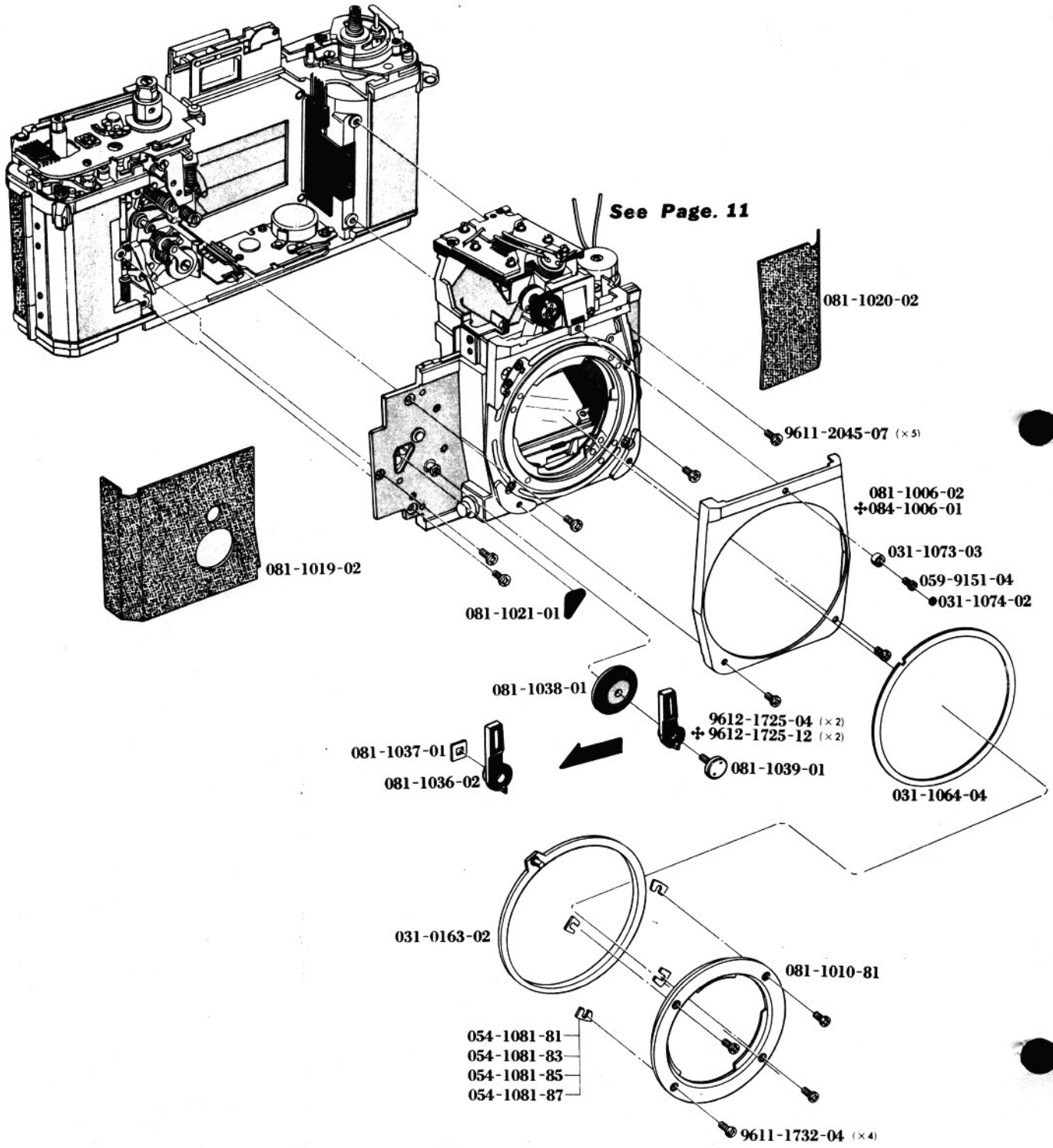


Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0321-01	Rewinding knob lever set　巻戻しクランクレバーセット	1
081-0380-01	Top cover pressure set　上カバー押えセット	1
081-0390-01	ASA ring set　ＡＳＡリングセット	1
081-0391-01	ASA ring plate set　ＡＳＡリング板セット	1
081-0392-01	Exposure adjustment control set　ＡＳＡ操作ノブセット	1
081-4129-02	Exposure correction ring lock spring　露出補正リングロックバネ	1
081-4123-03	ASA lock plate　ＡＳＡロック板	1
081-4127-03	Exposure correction ring click spring　露出補正リングクリックバネ	1
9611-1416-01	Phillips type screw　十字穴付なべ頭小ねじ	3
081-0604-01	Shutter speed/Function Selector　シャッターダイヤルセット	1
081-0332-01	Auto lock nail set　オートロック爪セット	1
081-2028-02	Auto lock button　オートロックボタン	1
081-2029-01	Auto lock spring　オートロックスプリング	1
9721-0120-13	Coupling washer　割ワッシャー	1
9791-2135-50	Washer　薄ワッシャー	1
081-2002-01	Shutter speed dial　シャッタースピードダイヤル	1
081-3301-02	Rewinding knob　巻戻しノブ	1
081-3303-02	Rewinding knob lever spring　巻戻しハンドルスプリング	1
081-4124-02	Exposure correction dial　露出補正ダイヤル	1
081-4130-02	Cover ring　覆いリング	1
9612-1423-01	Phillips type screw　十字穴付なべ頭小ねじ	1

Black body parts

084-0390-01	ASA ring set　ＡＳＡリングセット	1
081-0391-01	ASA ring plate set　ＡＳＡリング板セット	1
084-0392-01	ASA operation knob set　ＡＳＡ操作ノブセット	1
081-4129-02	Exposure correction lock spring　露出補正ロックバネ	1
081-4123-03	ASA lock plate　ＡＳＡロック板	1
081-4127-03	Exposure correction click spring　露出補正クリックバネ	1
9611-1416-01	Phillips type screw　十字穴付なべ頭小ねじ	3
084-0604-01	Shutter dial set　シャッターダイヤルセット	1
081-0332-01	Auto lock nail set　オートロック爪セット	1
081-2028-02	Auto lock button　オートロックボタン	1
081-2029-01	Auto lock spring　オートロックスプリング	1
9721-0120-13	Coupling washer　割ワッシャー	1
9791-2135-50	Washer　薄ワッシャー	1
084-3301-01	Rewinding knob　巻戻しノブ	1

XE (081·084)
XE-I (082·085)
XE-7 (086)

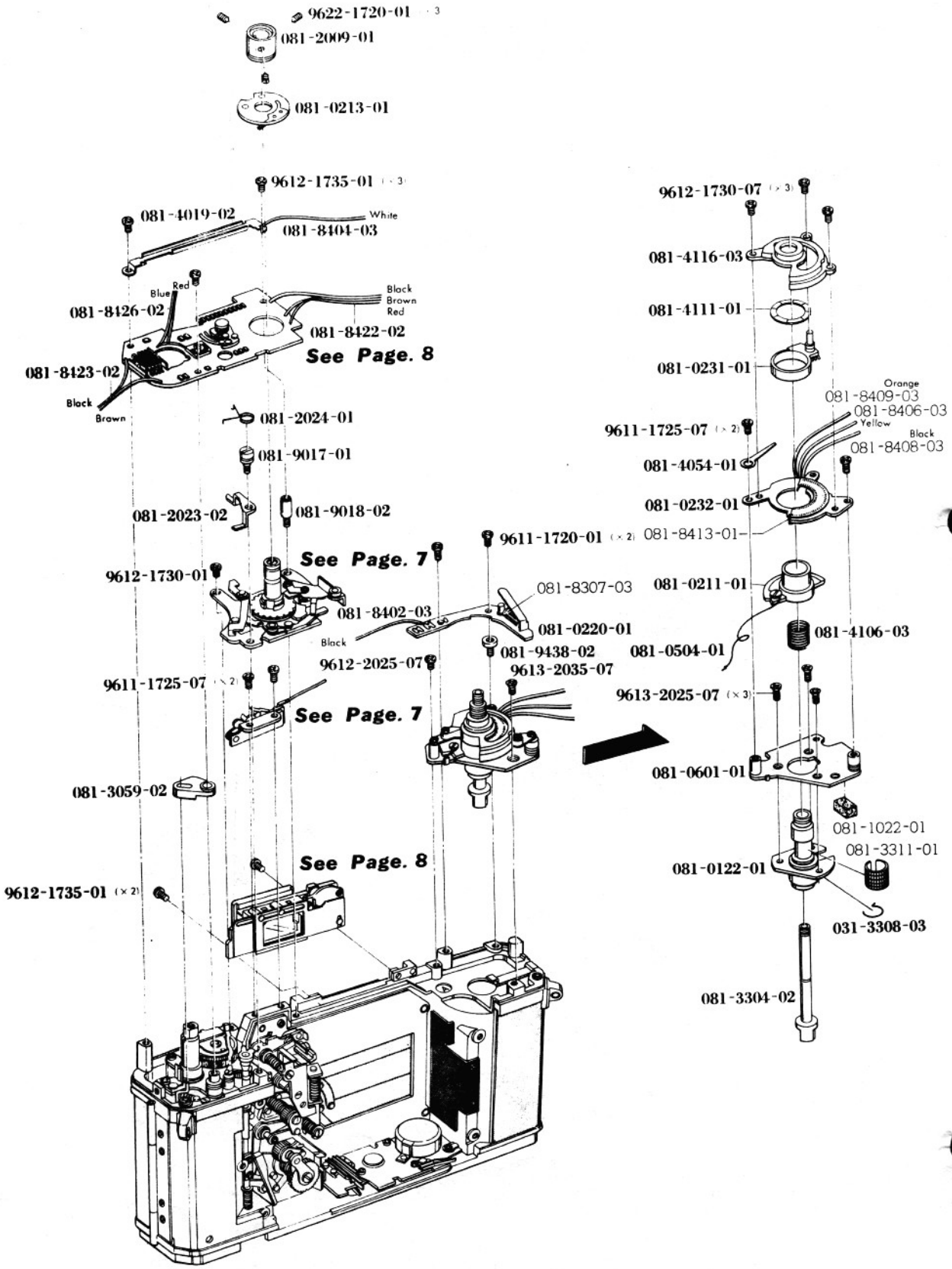


Part No. 部品番号	Part Name 部品名称		Unit 員数
031-0163-02	Aperture coupling ring set 連結リングセット		1
081-1006-02	Front cover 前カバー		1
081-1010-81	Baynet lens mount ミノルタマウント		1
081-1019-02	Body leather (Right) ボデー貼皮（右）		1
081-1020-02	Body leather (Left) ボデー貼皮（左）		1
081-1021-01	Shield cap 前枠蓋		1
081-1036-02	Self timer lever セルフタイマーレバー		1
081-1037-01	Self lever key セルフレバーキー		1
081-1038-01	Self lever bush セルフレバー座		1
081-1039-01	Self lever set screw セルフレバー止めねじ		1
031-1064-04	Coupling ring washer 連結リングワッシャー		1
031-1073-03	Red dot frame 前カバー指標枠		1
031-1074-02	Red dot レンズ交換指標		1
054-1081-81	Body-back adjusting washer (0.02t)	修理用座板調整ワッシャー (0.02t)	調整用
054-1081-83	Body-back adjusting washer (0.05t)	修理用座板調整ワッシャー (0.05t)	調整用
054-1081-85	Body-back adjusting washer (0.06t)	修理用座板調整ワッシャー (0.06t)	調整用
054-1081-87	Body-back adjusting washer (0.1t)	修理用座板調整ワッシャー (0.1t)	調整用
059-9151-04	Red dot screw 前カバー指標ビス		1
9611-1732-04	Phillips type screw 十字穴付なべ頭小ねじ		4
9611-2045-07	Phillips type screw 十字穴付なべ頭小ねじ		5
9612-1725-04	Phillips type screw 十字穴付なべ頭小ねじ		2

Black body parts

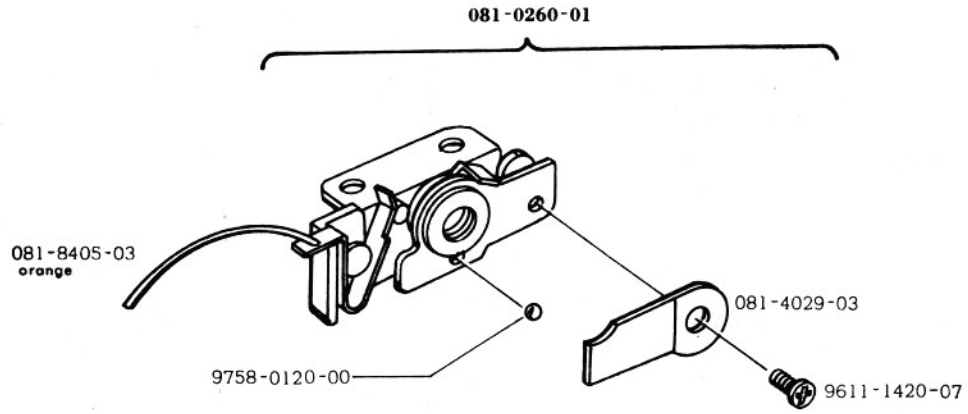
084-1006-01	Front cover 前カバー	1
9612-1725-12	Phillips type screw 十字穴付なべ頭小ねじ	2

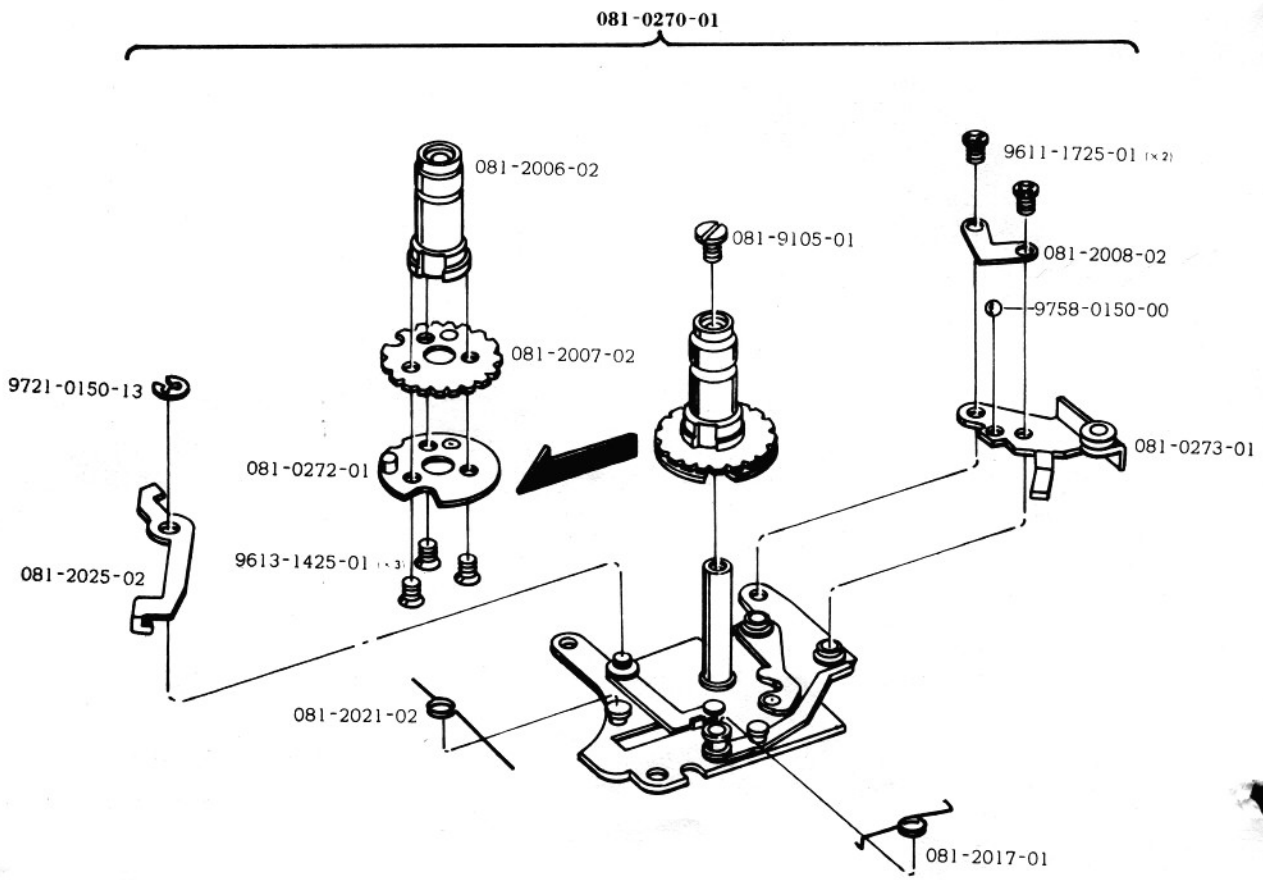
XE (081·084)
XE-1 (082·085)
XE-7 (086)



Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0122-01	Rewinding bearing set 巻戻し軸受セット	1
081-3311-01	Bearing keeper tape 軸受保護テープ	1
081-0211-01	Diaphragm pulley set 絞りプーリーセット	1
081-0213-01	Brush holder set ブラシホルダーセット	1
081-0220-01	B.C base plate set B．C基板セット	1
081-8307-03	Battery checker lamp バッテリーチェッカーランプ	1
081-0231-01	ASA contact base plate set ＡＳＡ接片取付台セット	1
081-0232-01	ASA diaphragm rub resistor set ＡＳＡ絞り摺動抵抗体セット	1
081-8406-03	Lead wire (Yellow L=105mm) 0.6φ /7 wires (0.08φ) リード線（黄L＝105mm) 0.6φ /7芯 (0.08φ)	1
081-8408-03	Lead wire (Black L=21mm) 0.6φ /7 wires (0.08φ) リード線(黒L＝21mm) 0.6φ /7芯 (0.08φ)	1
081-8409-03	Lead wire (Orange L=27mm) 0.6φ /7 wire (0.08φ) リード線（橙L＝27mm) 0.6φ /7芯 (0.08φ)	1
081-8413-01	Lead wire (L=5 mm, 0.18φ) 裸リード線（L＝5mm, 0.18φ）	1
081-0504-01	Diaphragm pulley string 絞りプーリーひも	1
081-0601-01	Rewinding base plate set 巻戻し軸台板セット	1
081-1022-01	Back cover lock side shield packing 裏蓋ロック部遮光パッキン	1
081-2009-01	Shutter speed dial pulley ＳＳダイヤルプーリー	1
081-2023-02	B-lever Bレバー	1
081-2024-01	B-lever spring Bレバースプリング	1
081-3059-02	Multiple exposure operation lever 多重露出操作レバー	1
081-3304-02	Rewinding axis 巻戻し軸	1
031-3308-03	Rewinding axis spring 巻戻し軸スプリング	1
081-4019-02	Coad pressure-A コード押えA	1
081-4054-01	Coad pressure-D コード押えD	1
081-4106-03	Diaphragm moving spring 絞り駆動スプリング	1
081-4111-01	ASA contact base plate press washer ＡＳＡ接片押え板	1
081-4116-03	Resistor plate set base 抵抗板取付台	1
081-8402-03	Lead wire (Black L=75mm) 0.6φ /7 wires (0.08φ) リード線(黒L=75mm) 0.6φ /7芯(0.08φ)	1
081-8404-03	Lead wire (White L=60mm) 0.6φ /7 wires (0.08φ) リード線(白L=60mm) 0.6φ /7芯(0.08φ)	1
081-8422-02	Ribbon coad B (Black·Brown·Red L=45mm) 0.6φ /7 wires (0.08φ) リボンコードB (黒·茶·赤L=45mm) 0.6φ /7芯(0.08φ)	1
081-8423-02	Ribbon coad C (Black·Brown L=290mm) 0.6φ/7 wires (0.08φ) リボンコード (黒·茶L=290mm) 0.6φ /7芯(0.08φ)	1
081-8426-02	Ribbon coad F (Red·Blue L=80mm) 0.6φ /7 wires (0.08φ) リボンコード (赤·青L=80mm) 0.6φ /7芯(0.08φ)	1
081-9017-01	Base plate set axis-A 台板取付軸A	1
081-9018-02	Base plate set axis-B 台板取付軸B	1
081-9438-02	B.C print plate axis B.C基板支持柱	1
9611-1720-01	Phillips type screw 十字穴付なべ頭小ねじ	2
9611-1725-07	Phillips type screw 十字穴付なべ頭小ねじ	4
9612-1730-01	Phillips type screw 十字穴付なべ頭小ねじ	1
9612-1730-07	Phillips type screw 十字穴付なべ頭小ねじ	3
9612-1735-01	Phillips type screw 十字穴付なべ頭小ねじ	5
9612-2025-07	Phillips type screw 十字穴付なべ頭小ねじ	1
9613-2025-07	Phillips type screw 十字穴付皿頭小ねじ	3
9613-2035-07	Phillips type screw 十字穴付皿頭小ねじ	1
9622-1720-01	Screw とがり先止めねじ	3

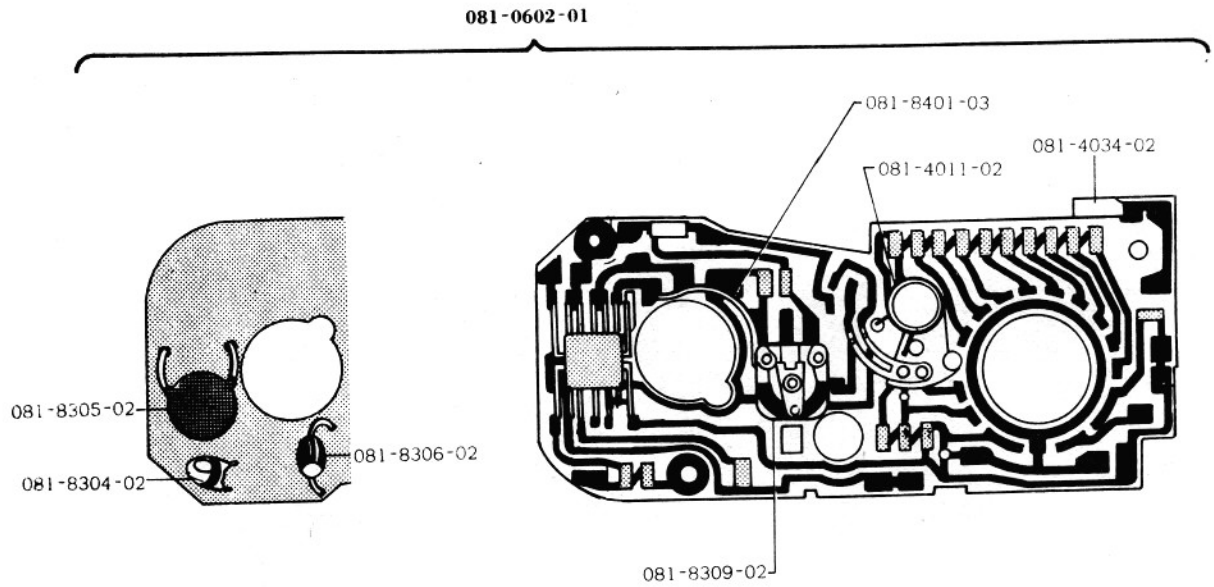
XE (081·084)
XE-1 (082·085)
XE-7 (086)

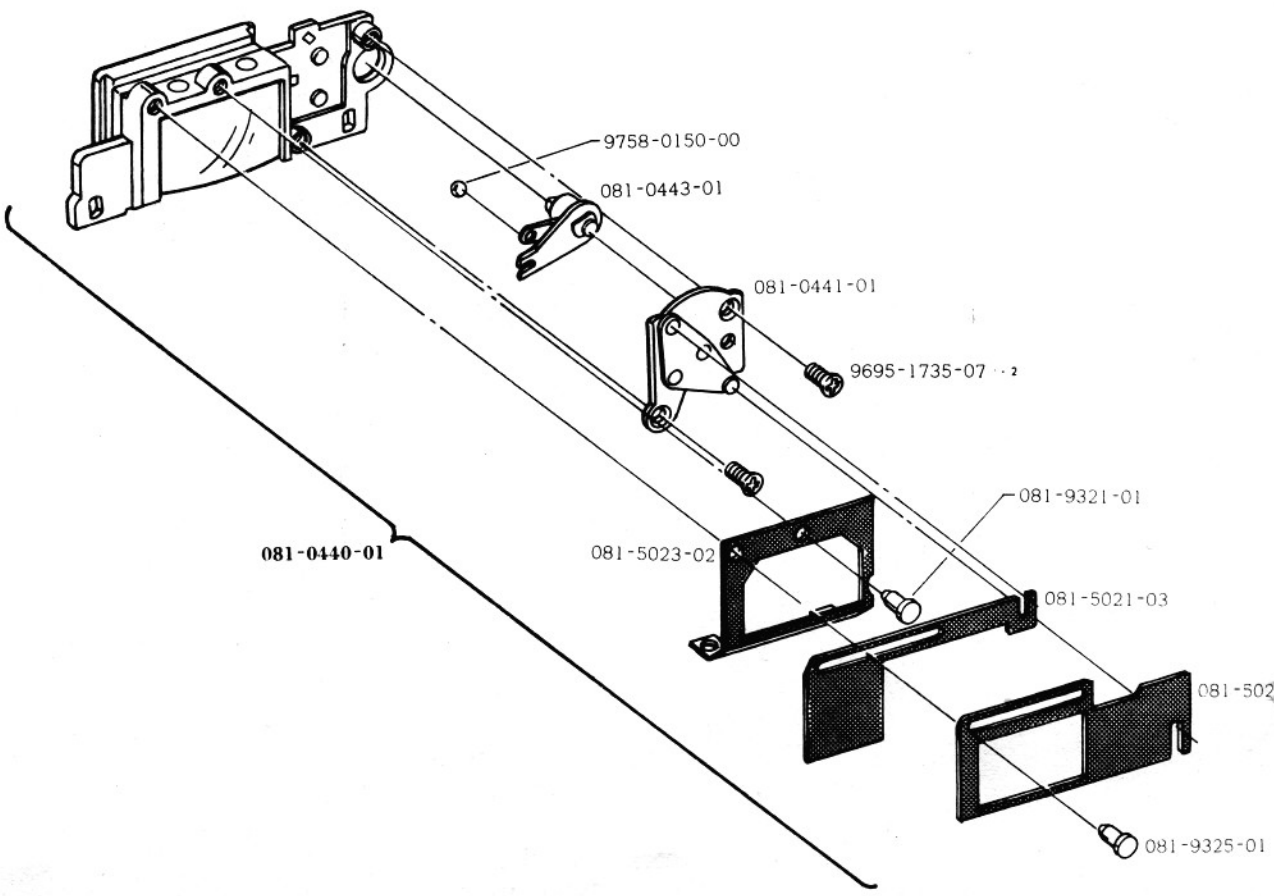




Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0260-01	Power switch plate set　メインスイッチ板セット	1
081-4029-03	Click plate-A　クリック板A	1
081-8405-03	Lead wire (Orange L＝60mm) 0.6φ /7 wires (0.08φ)　リード線(橙L=60mm) 0.6φ /7芯(0.08φ)	1
9611-1420-07	Phillips type screw　十字穴付なべ頭小ねじ	1
9758-0120-00	Steel ball (1.2φ)　スチールボール (1.2φ)	1
081-0270-01	Shutter dial base plate set　シャッターダイヤル台板セット	1
081-0272-01	B cam set　Bカムセット	1
081-0273-01	Pulley holder set　プーリーホルダーセット	1
081-2006-02	Cam axis　カム軸	1
081-2007-02	Click plate　クリック板	1
081-2008-02	Shutter speed click spring　SSクリックばね	1
081-2017-01	Signal release lever spring　信号解除レバースプリング	1
081-2021-02	B operation lever spring　B連動レバースプリング	1
081-2025-02	Shutter button lock lever　シャッターボタンロックレバー	1
081-9105-01	Shutter dial cam axis set screw　シャッターダイヤルカム軸止めビス	1
9611-1725-01	Phillips type screw　十字穴付なべ頭小ねじ	2
9613-1425-01	Phillips type screw　十字穴付皿頭小ねじ	3
9721-0150-13	Couping washer　割ワッシャー	1
9758-0150-00	Steel ball (1.5φ)　スチールボール (1.5φ)	1

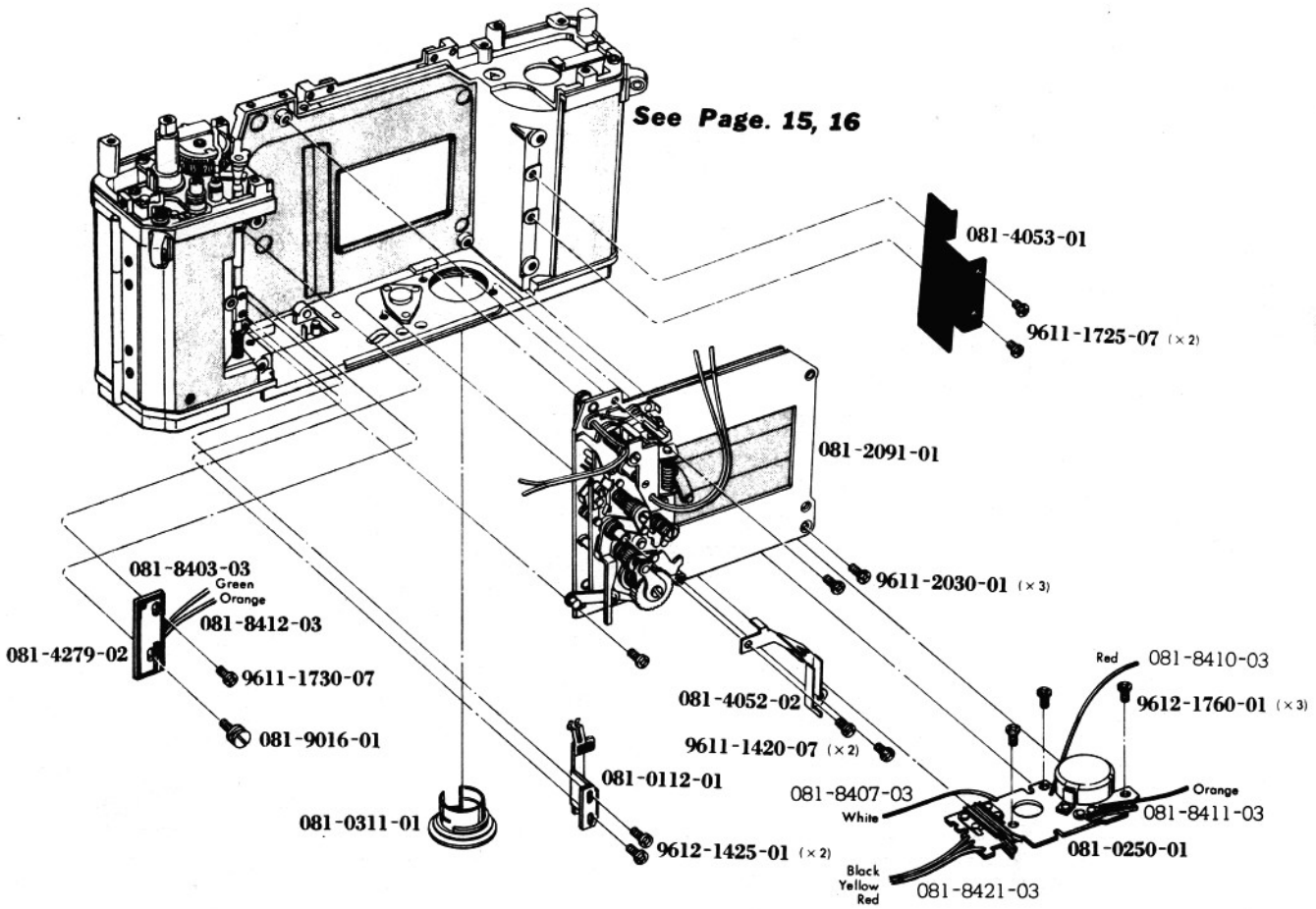
XE (081·084)
XE-1 (082·085)
XE-7 (086)





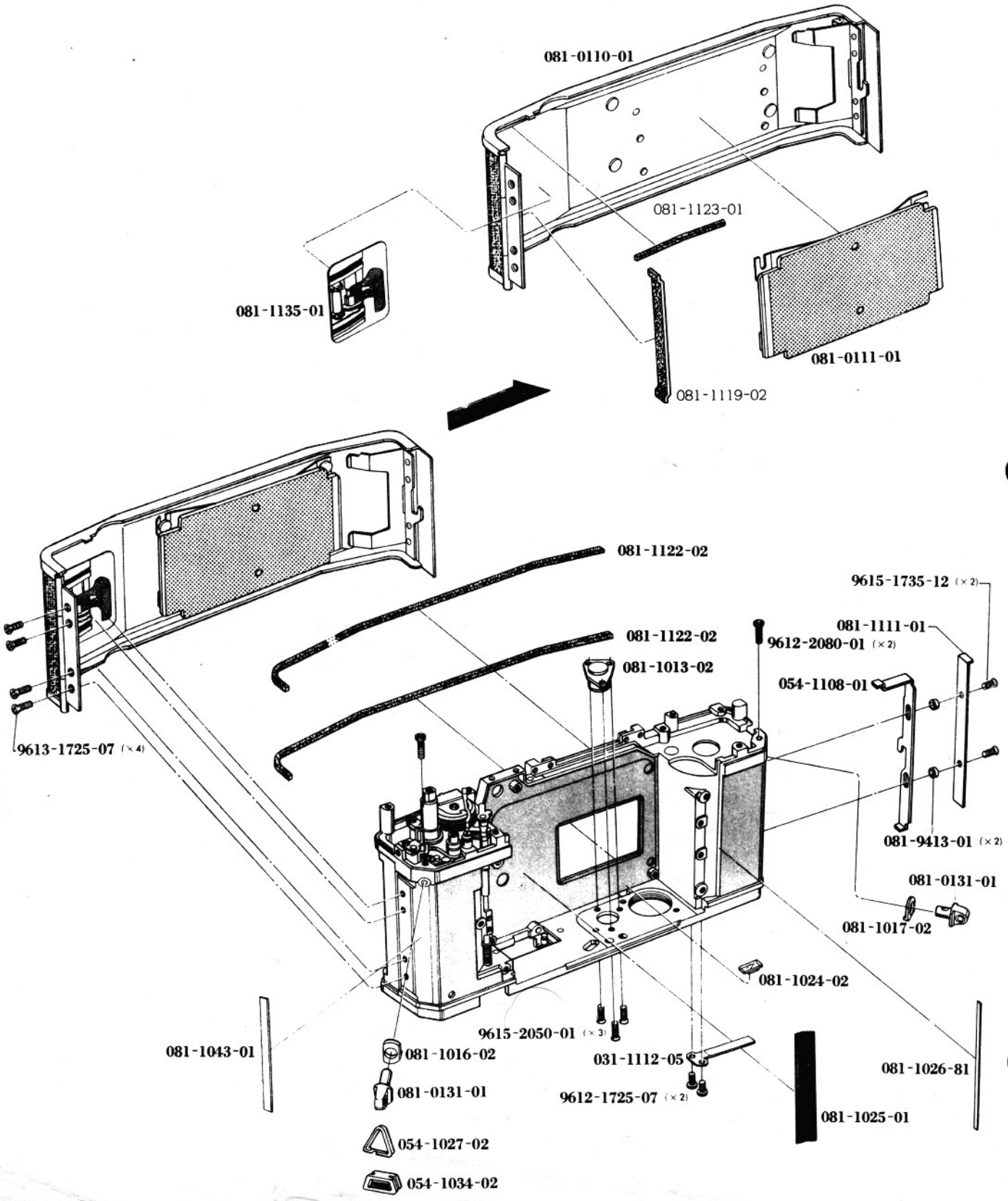
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0440-01	Eye-piece frame set　接眼枠セット	1
081-0441-01	Eye-piece shutter base plate set　アイシャッター台板セット	1
081-0443-01	Change lever axis set　切換レバー軸セット	1
081-5021-03	Eye-piece shutter mask-A　アイピースマスクA	1
081-5022-03	Eye-piece shutter mask-B　アイピースマスクB	1
081-5023-02	Frame-B　制限枠B	1
081-9321-01	Mask guide axis-A　マスクガイド軸A	1
081-9325-01	Mask guide axis-B　マスクガイド軸B	1
9695-1735-07	Phillips type tapping screw　十字穴付皿頭タッピンねじ	2
9758-0150-00	Steel ball (1.5ϕ)　スチールボール (1.5ϕ)	1
081-0602-01	Printed base plate-B　回路基板B	1
081-4011-02	A-M change switch spring　A-M切換スイッチスプリング	1
081-4034-02	Power switch contact-A　メインスイッチ接片A	1
081-8304-02	Condenser C_3 (0.1μF)　コンデンサーC_3 (0.1μF)	1
081-8305-02	Condenser C_4 (0.05μF)　コンデンサーC_4 (0.05μF)	1
081-8306-02	Diode (KB-165)　ダイオード (KB-165)	1
081-8309-02	Variable resistor R_{10} (68KΩ)　半固定抵抗R_{10} (68KΩ)	1
081-8401-03	Lead wire (Green L=27mm) 0.6ϕ/7 wires (0.08ϕ)　リード線(緑L=27mm) 0.6ϕ/7芯(0.08ϕ)	1

XE (081·084)
XE-1 (082·085)
XE-7 (086)



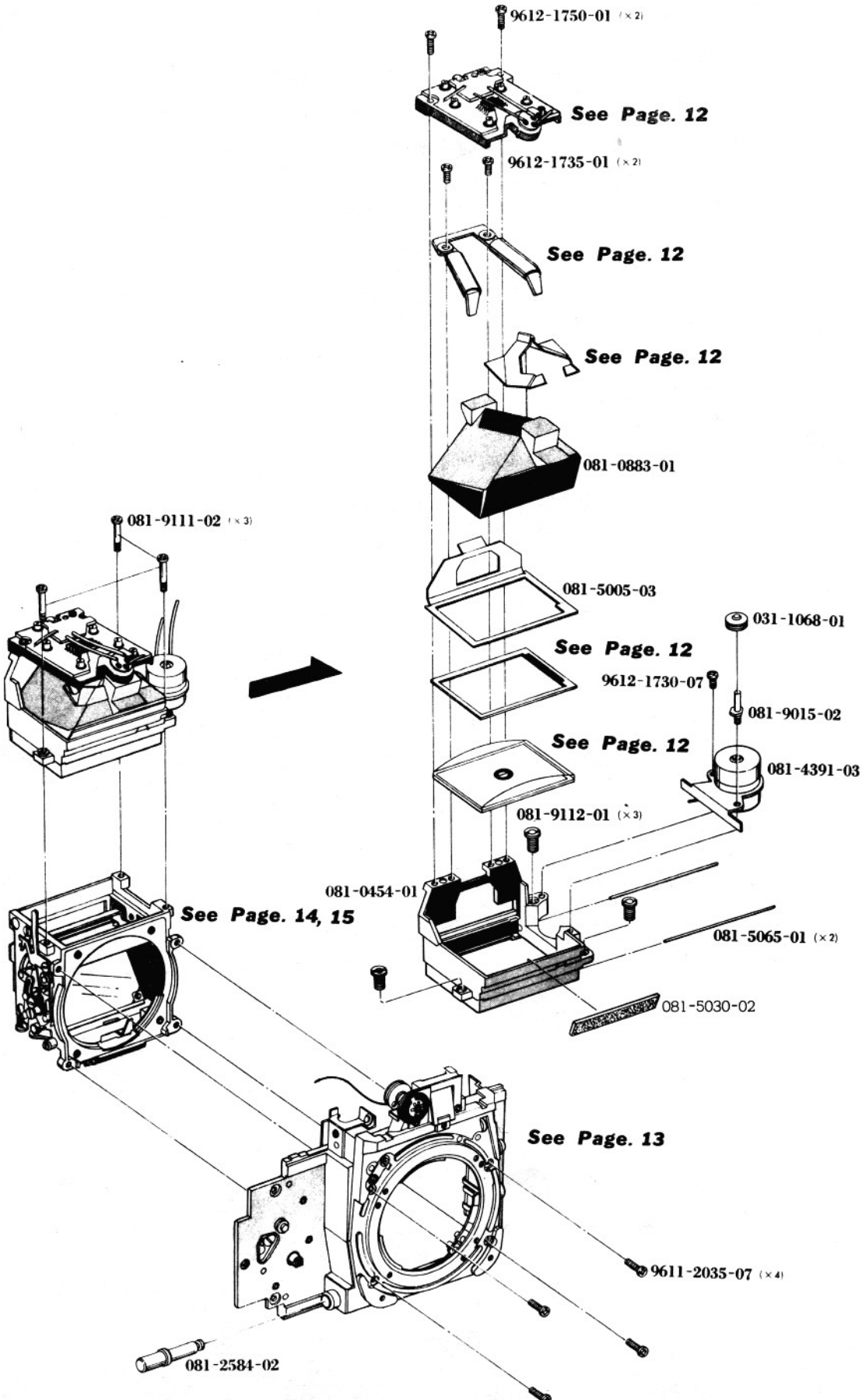
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0112-01	Release plate set　レリーズ板セット	1
081-0250-01	Contact holder set　接片取付板セット	1
081-8407-03	Lead wire (White L＝158mm) 0.6φ /7 wires (0.08φ)　リード線(白L＝158mm) 0.6φ /7芯(0.08φ)	1
081-8410-03	Lead wire (Red L＝130mm) 0.6φ /7 wires (0.08φ)　リード線(赤L＝130mm) 0.6φ /7芯(0.08φ)	1
081-8411-03	Lead wire (Orange L＝110mm) 0.6φ /7 wires (0.08φ)　リード線(橙L＝110mm) 0.6φ /7芯(0.08φ)	1
081-8421-03	Ribbon coad A (Black·Yellow·Red L＝130mm) 0.6φ /7 wires (0.08φ)　リボンコードA (黒·黄·赤L＝130mm) 0.6φ /7芯(0.08φ)	1
081-0311-01	Battely chamber set　電池室セット	1
081-2091-01	Shutter assembly　シャッターセット	1
081-4052-02	Wire coad press-B　コード押えB	1
081-4053-01	Wire coad press-C　コード押えC	1
081-4279-02	S_2 switch base　S_2スイッチベース	1
081-8403-03	Lead wire (Green L=120mm) 0.6φ /7 wires (0.08φ)　リード線(緑L＝120mm) 0.6φ /7芯(0.08φ)	1
081-8412-03	Lead wire (Orange L=68mm) 0.6φ /7 wires (0.08φ)　リード線(橙L＝68mm) 0.6φ /7芯(0.08φ)	1
081-9016-01	Lead wire plate guide axis　レリーズ板ガイド軸	1
9611-1420-07	Phillips type screw　十字穴付なべ頭小ねじ	2
9611-1725-07	Phillips type screw　十字穴付なべ頭小ねじ	2
9611-1730-07	Phillips type screw　十字穴付なべ頭小ねじ	1
9611-2030-01	Phillips type screw　十字穴付なべ頭小ねじ	3
9612-1425-01	Phillips type screw　十字穴付なべ頭小ねじ	2
9612-1760-01	Phillips type screw　十字穴付なべ頭小ねじ	3

XE (081·084)
XE-1 (082·085)
XE-7 (086)



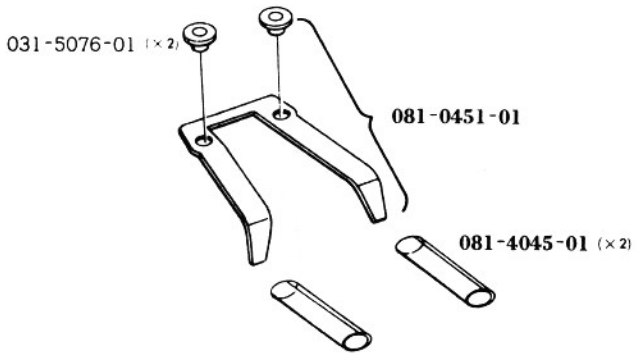
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0110-01	Back cover set 裏蓋セット	1
081-1119-02	Back cover shield 裏蓋遮光布	1
081-1123-01	Back cover shield sponge 裏蓋遮光パッキン	1
081-0111-01	Pressure plate set 圧着板セット	1
081-0131-01	Strap hanger 吊り金具	2
081-1013-02	Tripod socket hole 三脚取付ねじ穴	1
081-1016-02	Strap hanger bush (Right) 吊り環座（右）	1
081-1017-02	Strap hanger bush (Left) 吊り環座（左）	1
081-1024-02	Body side shutter blade stopper ボデー側シャッター羽根ストッパー	1
081-1025-01	Body shield paper ボデー遮光紙	1
081-1026-81	Front base correction tape 前板補正板	1
054-1027-02	Triangle hanger ring 三角吊り環	2
054-1034-02	Triangle hanger ring stopper 三角環廻り止め	2
081-1043-01	Tape 蝶番補正テープ	1
054-1108-01	Back cover lock 裏蓋ロック	1
081-1111-01	Lock pressure plate ロック押え板	1
031-1112-05	Lock spring ロックバネ	1
081-1122-02	Back cover side shield packing 裏蓋部遮光パッキン下	2
081-1135-01	Back cover seal フィルム装填案内銘板	1
081-9413-01	Lock guide ring ロックガイドリング	2
9612-1725-07	Phillips type screw 十字穴付なべ頭小ねじ	2
9612-2080-01	Phillips type screw 十字穴付なべ頭小ねじ	2
9613-1725-07	Phillips type screw 十字穴付皿頭小ねじ	4
9615-1735-12	Phillips type screw 十字穴付皿頭小ねじ	2
9615-2050-01	Phillips type screw 十字穴付皿頭小ねじ	3

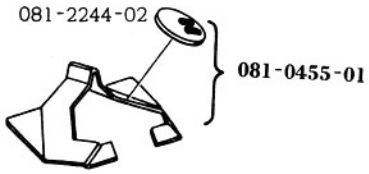
XE (081·084)
XE-1 (082·085)
XE-7 (086)

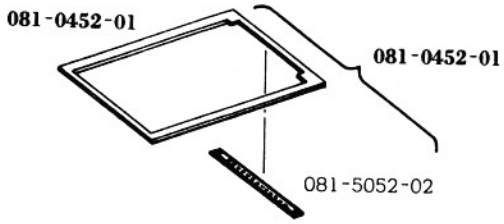


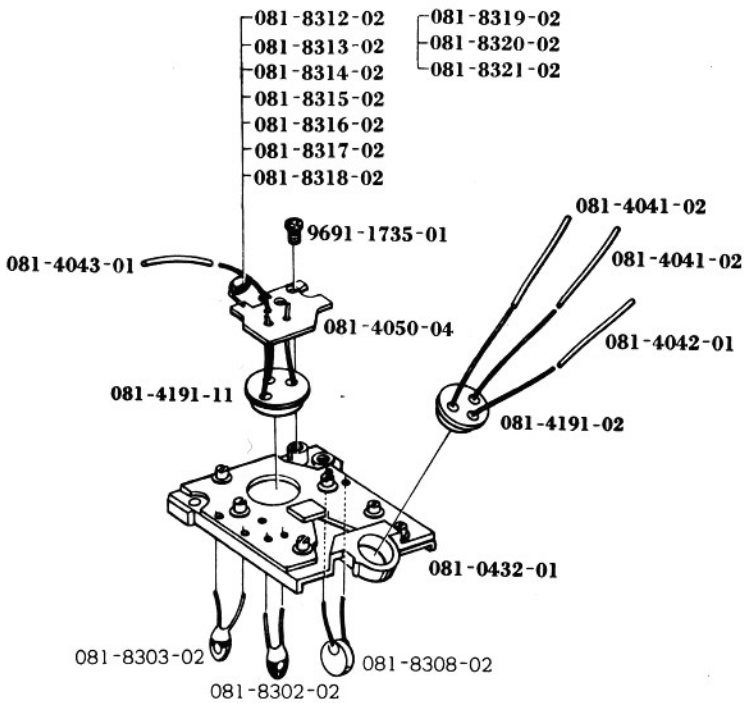
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0454-01	Penta. prism holder set　ペンタプリズムホルダーセット	1
081-5030-02	Penta. front pressure plate　ペンタ前面押え板	1
081-0883-01	Penta. prism set　ペンタプリズムセット	1
081-4391-03	Exposure meter moving coil set　電流計セット	1
031-1068-01	AV middle pulley-A　AV中間プーリーA	1
081-2584-02	Stop-down button axis　プレビュー釦軸	1
081-5005-03	Restriction frame-A　制限枠A	1
081-5065-01	Condenser pressure spring　コンデンサー押えスプリング	2
081-9015-02	Meter set screw　メーター取付ビス	1
081-9111-02	Penta. holder set screw　ペンタホルダー取付ビス	3
081-9112-01	Focus adjusting nut B　ピント調整ナットB	3
9611-2035-07	Phillips type screw　十字穴付なべ頭小ねじ	4
9612-1730-07	Phillips type screw　十字穴付なべ頭小ねじ	1
9612-1735-01	Phillips type screw　十字穴付なべ頭小ねじ	2
9612-1750-01	Phillips type Screw　十字穴付なべ頭小ねじ	2

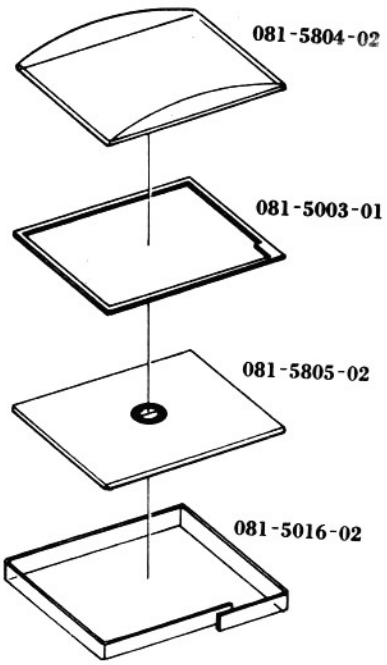
XE (081·084)
XE-1 (082·085)
XE-7 (086)





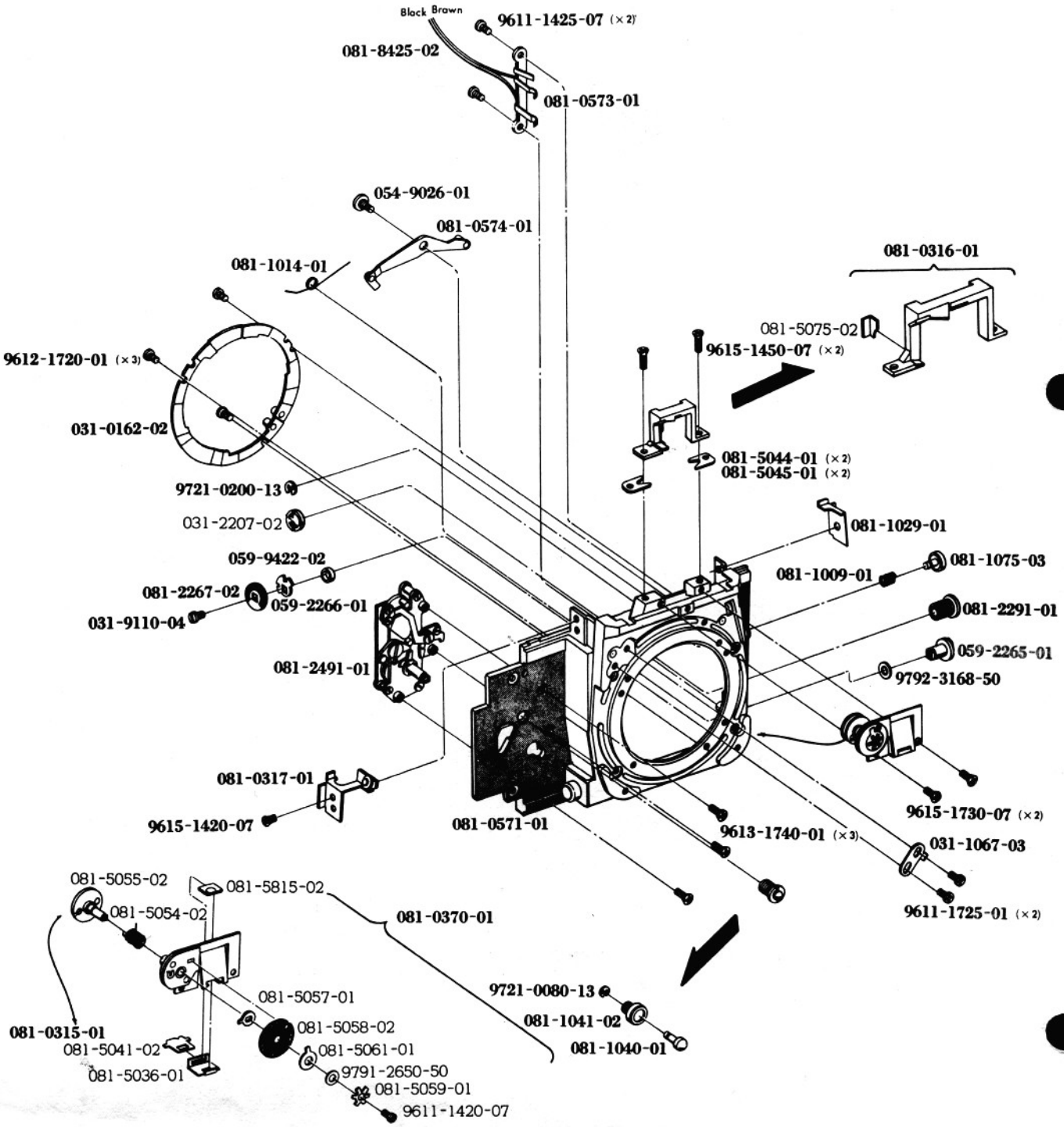






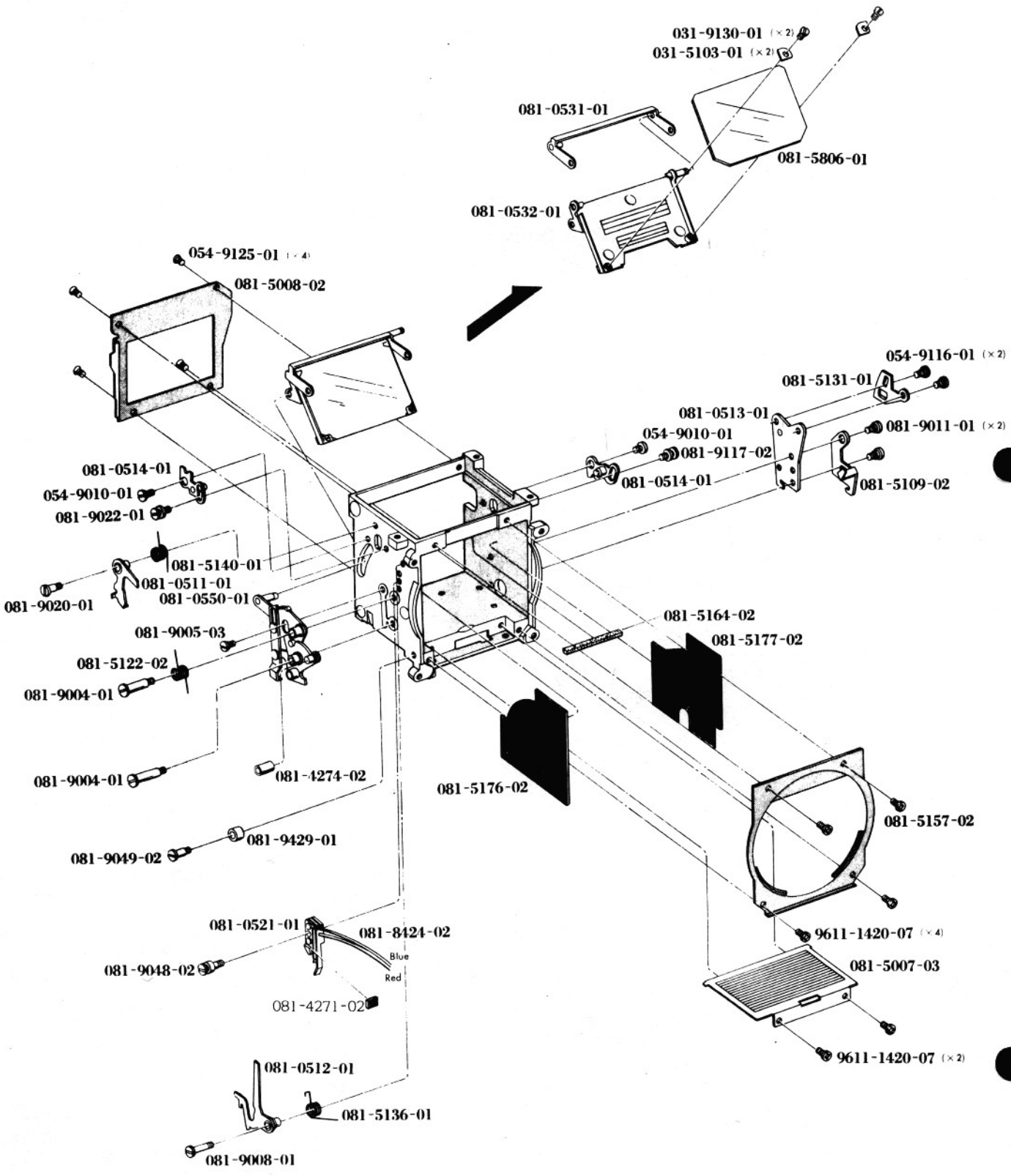
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0432-01	Printed base plate A set 回路基板Aセット	1
081-8302-02	Condenser-C_1 (2.2μF) コンデンサーC_1 (2.2μF)	1
081-8303-02	Condenser-C_2 (1μF) コンデンサーC_2 (1μF)	1
081-8308-02	Thermistor (TD5-A170 or TD5-C170) サーミスター(TD5-A170 or TD5-C170)	1
081-0451-01	Penta pressure spring set ペンタ押えバネセット	1
031-5076-01	Penta pressure collar ペンタ押えカラー	2
081-0452-01	Penta frame set ペンタ枠セット	1
081-5052-02	Meter figure set メーター目盛板	1
081-0455-01	Penta pressure plate ペンタ押え板	1
081-2244-02	Synchro base plate シンクロ中継基板	1
081-4041-02	Isolation tube A (L=24.5mm 1.2ϕ) イラックス絶縁チューブA(L=24.5mm 1.2ϕ)	2
081-4042-01	Isolation tube B (L=13mm 1.2ϕ) イラックス絶縁チューブB(L=13mm 1.2ϕ)	1
081-4043-01	Isolation tube C (L=9mm 1.2ϕ) イラックス絶縁チューブC(L=9mm 1.2ϕ)	1
081-4045-01	Protection isolation tube A (L=17mm 4.4ϕ) スミチューブA(L=17mm 4.4ϕ)	2
081-4050-04	Flexible plate 結線板	1
081-4191-02	CdS photocell-Front (8～16KΩ・Red) CdS受光部-前(8～16KΩ・赤)	1
081-4191-11	CdS photocell-Rear (12～20KΩ・Green) CdS受光部-後(12～20KΩ・緑)	1
081-5003-01	Space plate 間隔板	1
081-5016-02	Packing tape 防塵テープ	1
081-5804-02	Condenser (BK7) コンデンサー (BK7)	1
081-5805-02	Fresnel lens 焦点板	1
081-8312-02	Fixed Resister RP_2 75(KΩ) 固定抵抗RP_2 75(KΩ)	0～1
081-8313-02	Fixed Resister RP_3 82(KΩ) 固定抵抗RP_3 82(KΩ)	0～1
081-8314-02	Fixed Resister RP_4 91(KΩ) 固定抵抗RP_4 91(KΩ)	0～1
081-8315-02	Fixed Resister RP_5 100(KΩ) 固定抵抗RP_5 100(KΩ)	0～1
081-8316-02	Fixed Resister RP_6 110(KΩ) 固定抵抗RP_6 110(KΩ)	0～1
081-8317-02	Fixed Resister RP_7 120(KΩ) 固定抵抗RP_7 120(KΩ)	0～1
081-8318-02	Fixed Resister RP_8 130(KΩ) 固定抵抗RP_8 130(KΩ)	0～1
081-8319-02	Fixed Resister RP_9 150(KΩ) 固定抵抗RP_9 150(KΩ)	0～1
081-8320-02	Fixed Resister RP_{10} 160(KΩ) 固定抵抗RP_{10} 160(KΩ)	0～1
081-8321-02	Fixed Resister RP_{11} 180(KΩ) 固定抵抗RP_{11} 180(KΩ)	0～1
9691-1735-01	Phillips type tapping screw 十字穴付なべ頭タッピンねじ	1

XE (081·084)
XE-1 (082·085)
XE-7 (086)



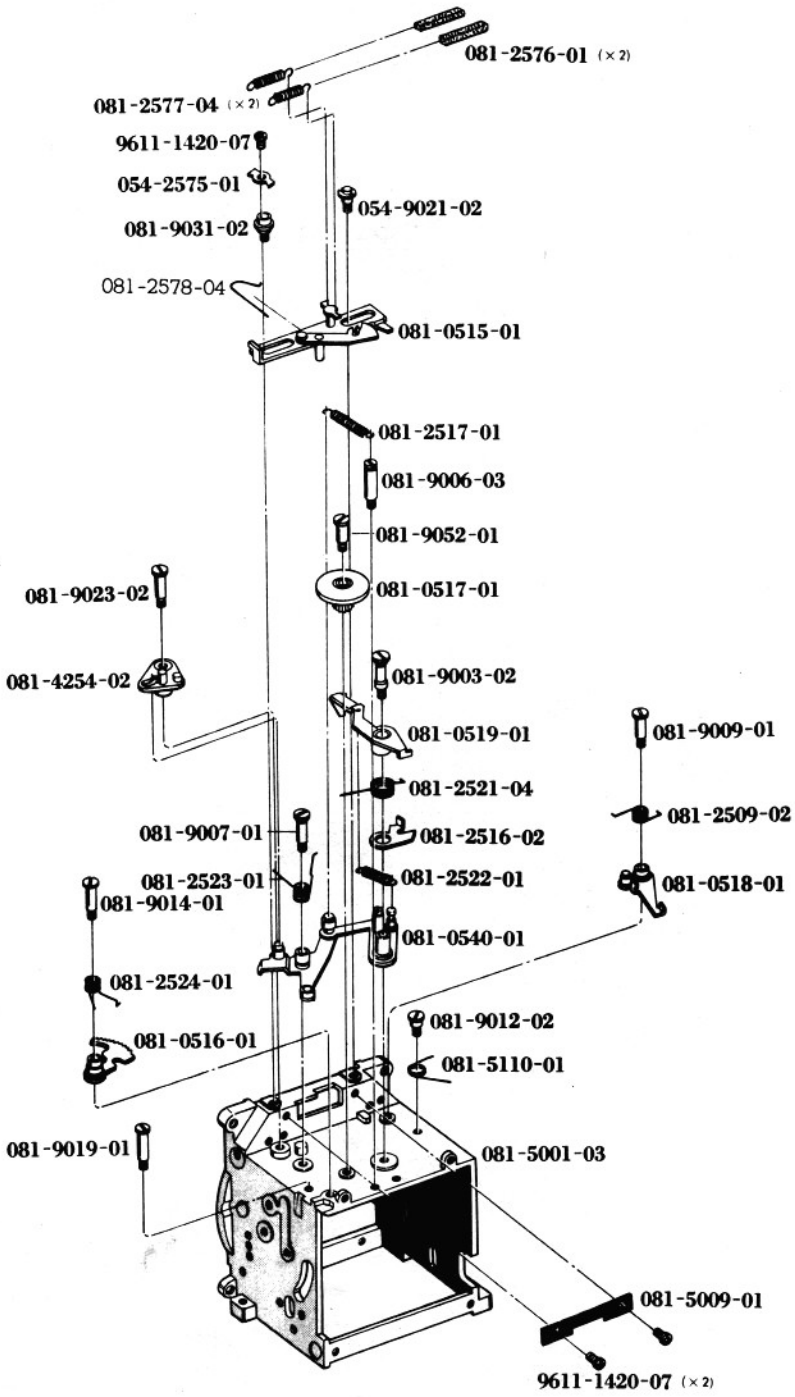
Part No. 部品番号	Part Name 部品名称	Unit 員数
031-0162-02	Bayonet mount spring set バヨネットスプリングセット	1
081-0315-01	S S designation base string ＳＳ表示連絡紐	1
081-0316-01	In finder mirror holder set インファインダーミラーホルダーセット	1
081-5075-02	In finder shade plate A インファインダー遮光板A	1
081-0317-01	Top cover second plate (Right) 上カバー補助板（右）	1
081-0370-01	In finder base plate インファインダー台板	1
081-5036-01	Diaphragm designation frame 絞り表示枠	1
081-5041-02	Diaphragm designation restrict frame 絞り表示制限枠	1
081-5054-02	S S designation pulley spring ＳＳ表示プーリースプリング	1
081-5055-02	S S designation pulley ＳＳ表示プーリー	1
081-5057-01	S S designation plate receiver ＳＳ表示板受け	1
081-5058-02	S S designation plate ＳＳ表示板	1
081-5059-01	S S designation plate pressuve ＳＳ表示板押え	1
081-5061-01	S S color filter ＳＳカラーフィルター	1
081-5815-02	Diaphragm in finder lens 絞りインファインダーレンズ	1
9611-1420-07	Phillips type screw 十字穴付なべ頭小ねじ	1
9791-2650-50	Washer 薄ワッシャー	1
081-0571-01	Front base plate set 前枠セット	1
081-0573-01	Synchro contact set シンクロ接片セット	1
081-0574-01	Lock lever set ロックレバーセット	1
081-2291-01	Synchro terminal set シンクロターミナルセット	1
031-2207-02	Synchro terminal nut 外筒締付ナット	1
081-2491-01	Self-timer gear set セルフギヤーセット	1
081-1009-01	Lock button spring ロック釦スプリング	1
081-1014-01	Lock lever spring ロックレバースプリング	1
081-1029-01	Top cover second plate (Left) 上カバー補助板（左）	1
081-1040-01	Self-timer start button セルフタイマースタート釦	1
081-1041-02	Self-timer button bush 始動釦座	1
031-1067-03	Aperture coupling ring stopper 連結リングストッパー	1
081-1075-03	Lens release button レンズ交換用釦	1
059-2265-01	Synchro selector switch ＦＰ，Ｘ切換スイッチ	1
059-2266-01	Synchro change switch click plate シンクロ切換スイッチクリック板	1
081-2267-02	Synchro change switch plate シンクロ切換スイッチローター	1
081-5044-01	In-finder adjustment washer A (0.5t) インファインダー調整ワッシャーA(0.5t)	2
081-5045-01	In-finder adjustment washer B (1.0t) インファインダー調整ワッシャーB(1.0t)	2
081-8425-02	Ribbon coad E (Black·Brown L=140mm) 0.6φ/7 wires (0.08φ) リボンコードE (黒·茶L=140mm) 0.6φ/7芯(0.08φ)	1
054-9026-01	Lock lever axis ロックレバー軸	1
031-9110-04	Synchro change switch knob set screw シンクロ切換スイッチつまみ止めビス	1
059-9422-02	Changing switch ring 切換スイッチ間隔リング	1
9611-1425-07	Phillips type screw 十字穴付な頭小ねじ	2
9611-1725-01	Phillips type screw 十字穴付な頭小ねじ	2
9612-1720-01	Phillips type screw 十字穴付な頭小ねじ	3
9613-1740-01	Phillips type screw 十字穴付皿頭小ねじ	3
9615-1420-07	Phillips type screw 十字穴付皿頭小ねじ	1
9615-1450-07	Phillips type screw 十字穴付皿頭小ねじ	2
9615-1730-07	Phillips type screw 十字穴付皿頭小ねじ	2
9721-0080-13	Couping washer 割ワッシャー	1
9721-0200-13	Couping washer 割ワッシャー	1
9792-3168-50	Washer 薄ワッシャー	1

XE (081·084)
XE-1 (082·085)
XE-7 (086)



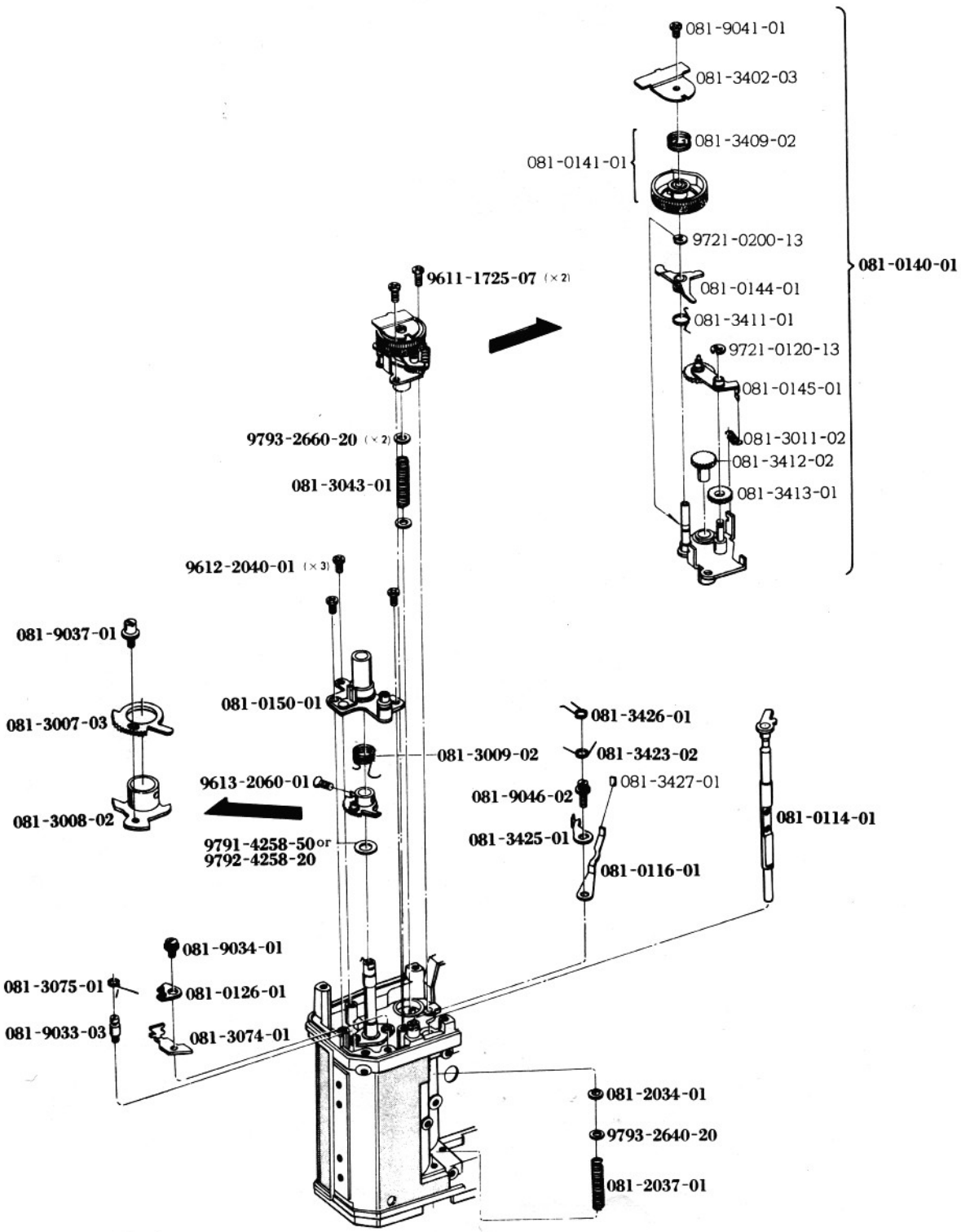
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0511-01	Mirror stop lever set ミラー係止レバーセット	1
081-0512-01	Mirror lock lever set ミラーロックレバーセット	1
081-0513-01	Mirror angle adjusting base plate set ミラー調整台板セット	1
081-0514-01	Mirror angle adjusting plate set ミラー調整板セット	2
081-0521-01	Switch 5 contact set S_5 接片セット	1
081-4271-02	Switch 5 damper S_5 ダンパー	1
081-0531-01	Mirror operation lever B set ミラー操作レバーBセット	1
081-0532-01	Mirror holder set ミラーホルダーセット	1
081-0550-01	Mirror operation lever set ミラー操作レバーセット	1
081-4274-02	Switch 5 isolation tube S_5 絶縁チューブ	1
081-5007-03	Under side frare shield plate 下部フレヤー防止板	1
081-5008-02	Mirror box mask ミラーボックスマスク	1
031-5103-01	Mirror set plate ミラー取付板	2
081-5109-02	Mirror stopper ミラーストッパー	1
081-5122-02	Mirror return spring ミラー戻しスプリング	1
081-5131-01	Mirror angle adjuster plate ミラー調整補助板	1
081-5136-01	Mirror lock spring ミラーロックスプリング	1
081-5140-01	Mirror stop lever set ミラー係止レバースプリング	1
081-5157-02	Flare sheild plate フレヤー防止板	1
081-5164-02	Mirror cusion ミラークッション	1
081-5176-02	Flare shied-A ミラーボックス側壁A	1
081-5177-02	Flare shied-B ミラーボックス側壁B	1
081-5806-01	Mirror ミラー	1
081-8424-02	Ribbon coad D (Red·Blue L=100mm) 0.6ϕ/7 wires (0.08ϕ) リボンコードD (赤·青L=100mm) 0.6ϕ/7芯(0.08ϕ)	1
081-9004-01	Mirror operation lever axis ミラー操作レバー軸	2
081-9005-03	Mirror operation lever guide ミラー操作レバーガイド	1
081-9008-01	Mirror lock lever axis ミラーロックレバー軸	1
054-9010-01	Mirror angle adjustment plate axis ミラー調整板軸	2
081-9011-01	Mirror stopper axis ミラーストッパー軸	2
081-9020-01	Mirror stop lever axis 係止レバー軸	1
081-9022-01	Mirror lock lever adjust ment axis ミラーロックレバーガタ防止軸	1
081-9048-02	Switch 5 setting screw S_5取付ビス	1
081-9049-02	M.P stopper axis M.Pストッパー軸	1
054-9116-01	Plate set pressure screw 位置決め板押えビス	2
081-9117-02	Mirror angle adjustment plate screw B ミラー位置調整板ビスB	1
054-9125-01	Mask pressure screw マスク押えビス	4
031-9130-01	Mirror pressure screw ミラー押えビス	2
081-9429-01	M.P stopper M.Pストッパー	1
9611-1420-07	Phillips type screw 十字穴付なべ頭小ねじ	6

XE (081·084)
XE-1 (082·085)
XE-7 (086)



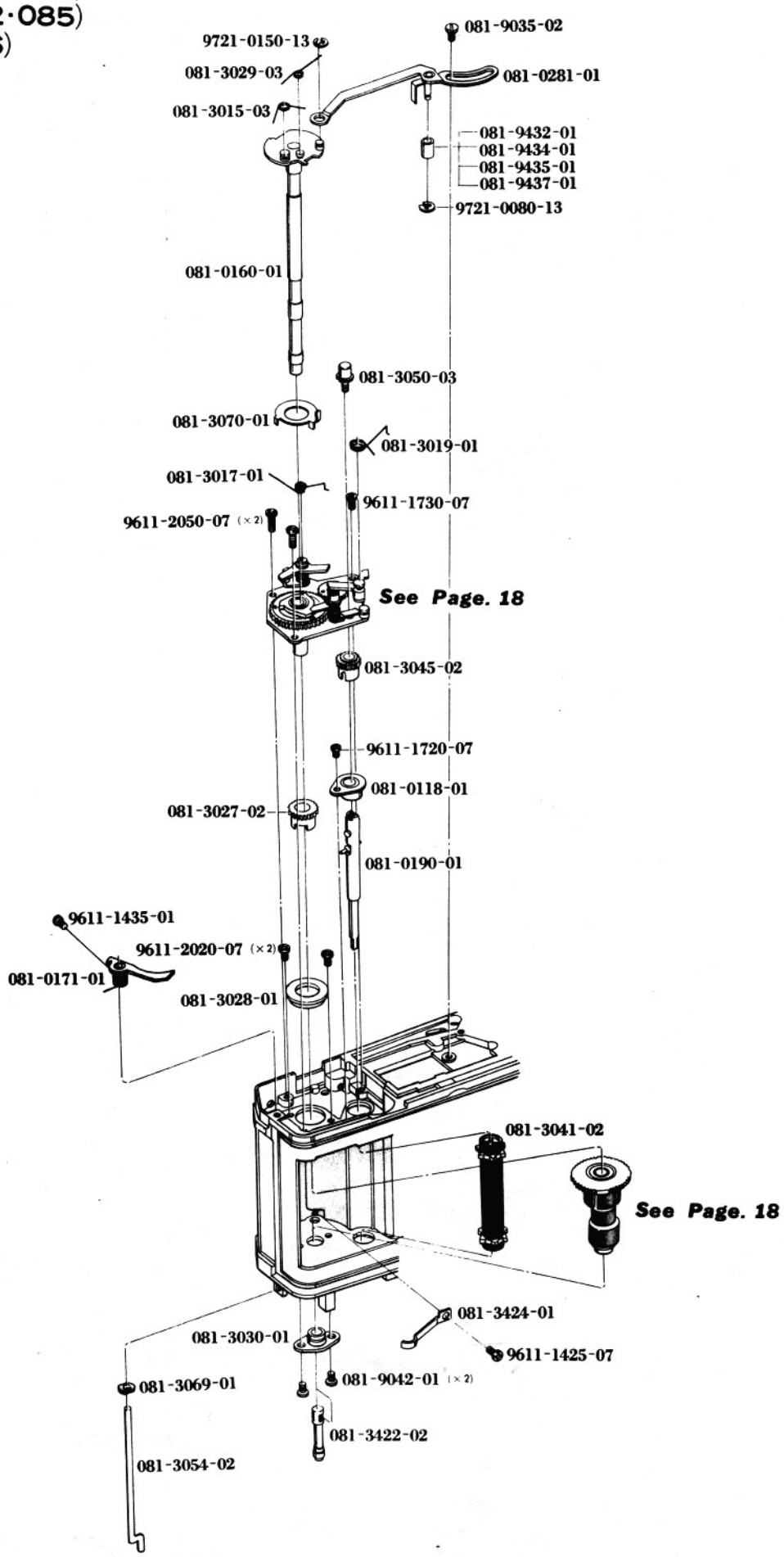
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0515-01	Diaphragm reducing plate set 絞り込み摺動板セット	1
081-2578-04	Stop-down operation spring プレビュー操作スプリング	1
081-0516-01	P brake lever set Pブレーキレバーセット	1
081-0517-01	Whyeel gear set ホイールギヤーセット	1
081-0518-01	P lock lever set Pロックレバーセット	1
081-0519-01	Preset lever set プリセットレバーセット	1
081-0540-01	Return lever set 復帰レバーセット	1
081-2509-02	P lock lever spring Pロックレバースプリング	1
081-2516-02	Preset second lever プリセット補助レバー	1
081-2517-01	Preset spring A プリセットスプリングA	1
081-2521-04	P combination spring P連結スプリング	1
081-2522-01	P combination scond spring P連結補助スプリング	1
081-2523-01	Preset spring B プリセットスプリングB	1
081-2524-01	P brake spring Pブレーキスプリング	1
054-2575-01	Stop-down spring hanger プレビューばね掛け	1
081-2576-01	Packing piece 防音片	2
081-2577-04	Pre-view spring プレビューばね	2
081-4254-02	Switch change lever スイッチ切換レバー	1
081-5001-03	Mirror box ミラーボックス	1
081-5009-01	Packing plate 防塵板	1
081-5110-01	Mirror stopper spring ミラーストッパースプリング	1
081-9003-02	P moving lever axis P駆動レバー軸	1
081-9006-03	Preset spring hanger A プリセットスプリング掛けA	1
081-9007-01	Return lever axis 復帰レバー軸	1
081-9009-01	P lock lever axis Pロックレバー軸	1
081-9012-02	P lock lever spring hanger Pロックレバースプリング掛け	1
081-9014-01	P brake axis Pブレーキ軸	1
081-9019-01	P brake spring hanger Pブレーキスプリング掛け	1
054-9021-02	Diaphragm plate axis B 絞り込み摺動板軸B	1
081-9023-02	Change lever axis 切換レバー軸	1
081-9031-02	Diaphragm plate axis A 絞り込み摺動板軸A	1
081-9052-01	Whyeel axis ホイール軸	1
9611-1420-07	Phillips type screw 十字穴付なべ頭小ねじ	3

XE (081·084)
XE-I (082·085)
XE-7 (086)



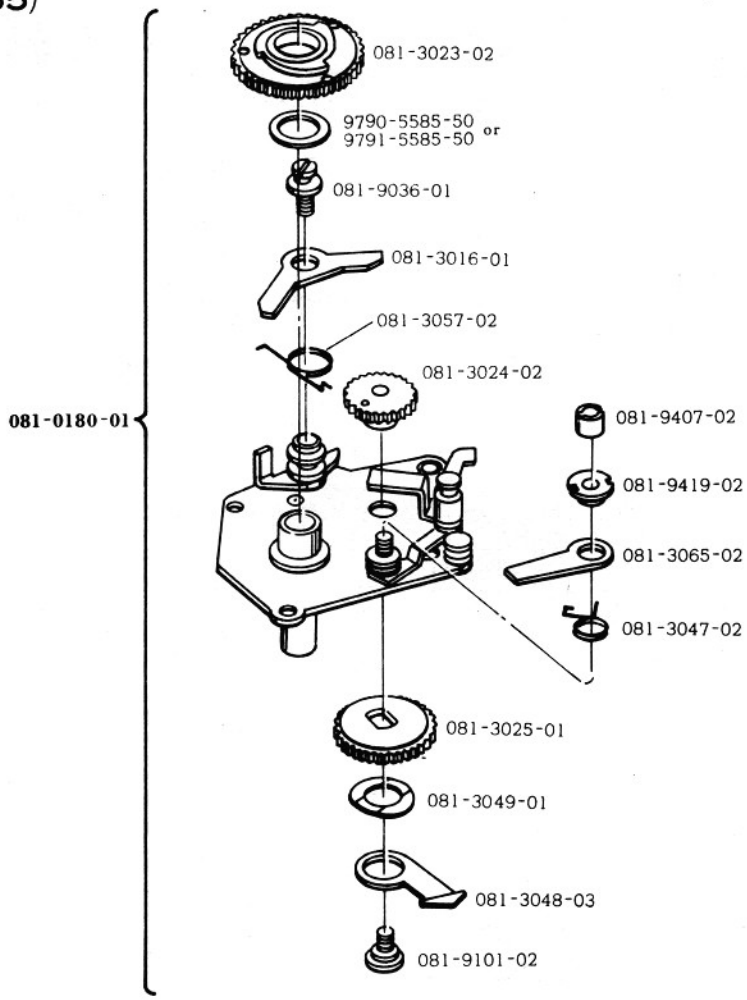
Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0114-01	Shutter axis set シャッター軸セット	1
081-0116-01	Film disignation lever set フィルム表示レバーセット	1
081-3427-01	Film disignation plate フィルム表示板	1
081-0126-01	Film advance operation lever set 巻取操作レバーセット	1
081-0140-01	Counter base plate set カウンター台板セット	1
081-0141-01	Counter dial set カウンターダイヤルセット	1
081-3409-02	Counter rewinding spring カウンター戻しスプリング	1
081-0144-01	Counter release lever set カウンター解除レバーセット	1
081-0145-01	Counter operation lever set カウンター駆動操作レバーセット	1
081-3011-02	Operation lever spring 操作レバースプリング	1
081-3402-03	Counter indicator カウンター指標	1
081-3411-01	Counter release lever spring カウンター解除レバースプリング	1
081-3412-02	Counter operation gear-A カウンター連結ギヤー	1
081-3413-01	Counter operation gear-B カウンター伝達ギヤー	1
081-9041-01	Counter index stopper screw カウンター指標止めビス	1
9721-0120-13	Coupling washer 割ワッシャー	1
9721-0200-13	Coupling washer 割ワッシャー	1
081-0150-01	Film advance axis bearing base plate set 巻取軸受台板セット	1
081-2034-01	Shutter axis plate setter S軸板止め	1
081-2037-01	Shutter axis spring シャッター軸スプリング	1
081-3007-03	Film advance operation ring A 巻取操作環A	1
081-3008-02	Film advance operation ring B 巻取操作環B	1
081-3009-02	Operation ring rewinding spring 操作環戻しスプリング	1
081-3043-01	R button release spring R釦解除スプリング	1
081-3074-01	Spring setter plate スプリング位置決め板	1
081-3075-01	Somersault spring トンボ返りスプリング	1
081-3423-02	Film disignation lever spring フィルム表示レバースプリング	1
081-3425-01	Disignation second lever 表示補助レバー	1
081-3426-01	Disgnation second lever spring 表示補助レバースプリング	1
081-9033-03	Operation lever spring hanger-B 操作レバースプリング掛けB	1
081-9034-01	Film advance operation lever axis 巻取操作レバー軸	1
081-9037-01	Operation ring rewinding spring hanger 操作環戻しスプリング掛け	1
081-9046-02	Disignation lever screw 表示レバービス	1
9611-1725-07	Phillips type screw 十字穴付なべ頭小ねじ	2
9612-2040-01	Phillips type screw 十字穴付なべ頭小ねじ	3
9613-2060-01	Phillips type screw 十字穴付皿頭小ねじ	1
9791-4258-50	Adjustment washer 薄ワッシャー	調整用
9792-4258-20	Adjustment washer 薄ワッシャー	調整用
9793-2640-20	Washer 薄ワッシャー	1
9793-2660-20	Washer 薄ワッシャー	2

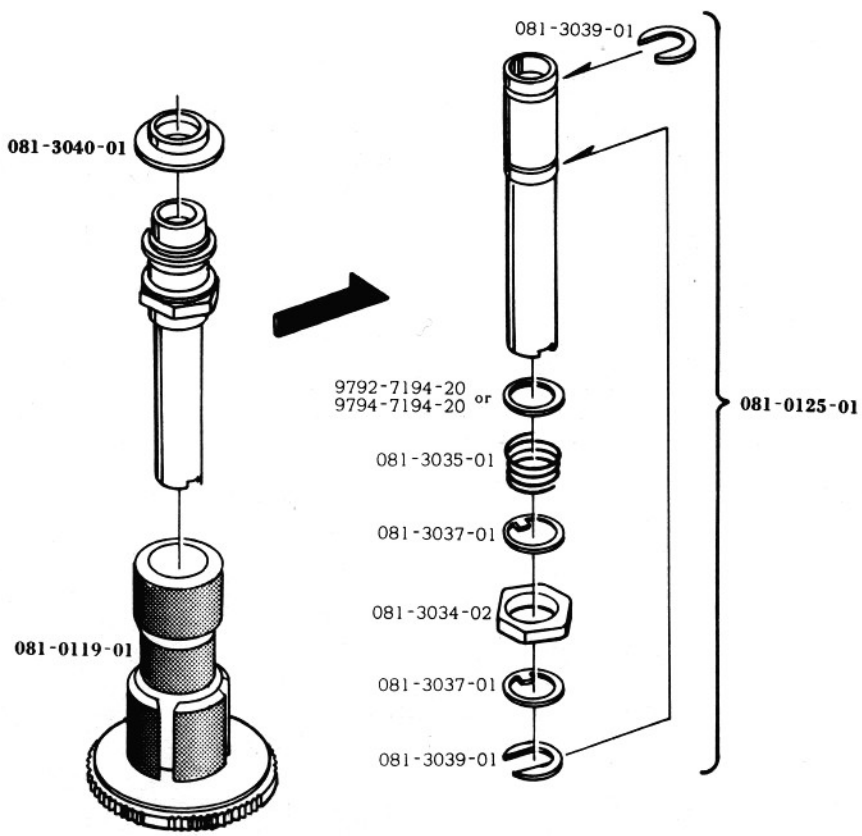
XE (081·084)
XE-I (082·085)
XE-7 (086)



Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0118-01	Sprocket gear base receiver set スプロケットギヤー受台セット	1
081-0160-01	Film advance axis set 巻取軸セット	1
081-0171-01	Film advance nail cancelletion set 巻取爪外しセット	1
081-0190-01	Sprocket axis set スプロケット軸セット	1
081-0281-01	Charge lever set チャージレバーセット	1
081-3015-03	Film advance nail spring A 巻取爪スプリングA	1
081-3017-01	Film advance stop lever spring 巻止めレバースプリング	1
081-3019-01	Reset lever spring リセットレバースプリング	1
081-3027-02	Spool gear スプールギヤー	1
081-3028-01	Spool gear axis receiver スプールギヤー軸受	1
081-3029-03	Film advance nail spring B 巻取爪スプリングB	1
081-3030-01	Spool axis receiver スプール軸受	1
081-3041-02	Sprocket スプロケット	1
081-3045-02	Sprocket gear スプロケットギヤー	1
081-3050-03	Film rewinding button フィルム巻戻し釦	1
081-3054-02	Multiple exposure coupling axis 多重露光結合軸	1
081-3069-01	Coupling axis packing 結合軸遮光パッキン	1
081-3070-01	Film advance nail lock plate 巻取爪ロック板	1
081-3422-02	Disignation filler axis 表示フィラー軸	1
081-3424-01	Disignation filler 表示フィラー	1
081-9035-02	Charge lever guide チャージレバーガイド	1
081-9042-01	Spool axis receiver screw スプール軸受ビス	2
081-9432-01	Charge lever pin collar-D (4φ) チャージレバーピンカラーD(4φ)	1
081-9434-01	Charge lever pin collar-A (3φ) チャージレバーピンカラーA(3φ)	0～1
081-9435-01	Charge lever pin collar-B (3.5φ) チャージレバーピンカラーB(3.5φ)	0～1
081-9437-01	Charge lever pin collar-C (2.5φ) チャージレバーピンカラーC(2.5φ)	0～1
9611-1425-07	Phillips type screw 十字穴付なべ頭小ねじ	1
9611-1435-01	Phillips type screw 十字穴付なべ頭小ねじ	1
9611-1720-07	Phillips type screw 十字穴付なべ頭小ねじ	1
9611-1730-07	Phillips type screw 十字穴付なべ頭小ねじ	1
9611-2020-07	Phillips type screw 十字穴付なべ頭小ねじ	2
9611-2050-07	Phillips type screw 十字穴付なべ頭小ねじ	2
9721-0080-13	Coupling washer 割ワッシャー	1
9721-0150-13	Coupling washer 割ワッシャー	1

XE (081·084)
XE-1 (082·085)
XE-7 (086)





Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0119-01	Spool set スプールセット	1
081-0125-01	Spool axis set スプール軸セット	1
081-3034-02	Spool friction collar スプールフリクションカラー	1
081-3035-01	Friction spring フリクションスプリング	1
081-3037-01	Spool friction washer スプールフリクションワッシャー	2
081-3039-01	Slide spring stopper ring 滑りスプリング止め輪	2
9792-7194-20	Adjustment washer 薄ワッシャー	調整用
9794-7194-20	Adjustment washer 薄ワッシャー	調整用
081-0180-01	Film advance base plate 巻取台板セット	1
081-3016-01	Film advance stop lever 巻止めレバー	1
081-3023-02	Film advance gear 巻取ギヤー	1
081-3024-02	Film advance idle gear 巻取アイドルギヤー	1
081-3025-01	Sprocket idle gear スプロケットアイドルギヤー	1
081-3047-02	R button lock spring R釦ロックスプリング	1
081-3048-03	Revesing stop nail-A 逆転止め爪A	1
081-3049-01	Reversing stop nail silent spring washer 逆転止め爪サイレントスプリングワッシャー	1
081-3057-02	Unexpected light stopper spring 不時露光防止スプリング	1
081-3065-02	Reversing stop nail-B 逆転止め爪B	1
081-9036-01	Film advance stop lever screw 巻止めレバービス	1
081-9101-02	Idle gear set screw アイドルギヤー止めビス	1
081-9407-02	Reversing stop nail collar pressure 逆転止め爪カラー押え	1
081-9419-02	Reversing stop nail collar 逆転止め爪カラー	1
9790-5585-50	Adjustment washer 薄ワッシャー	調整用
9791-5585-50	Adjustment washer 薄ワッシャー	調整用
081-3040-01	Filler ring フィラー当り環	1

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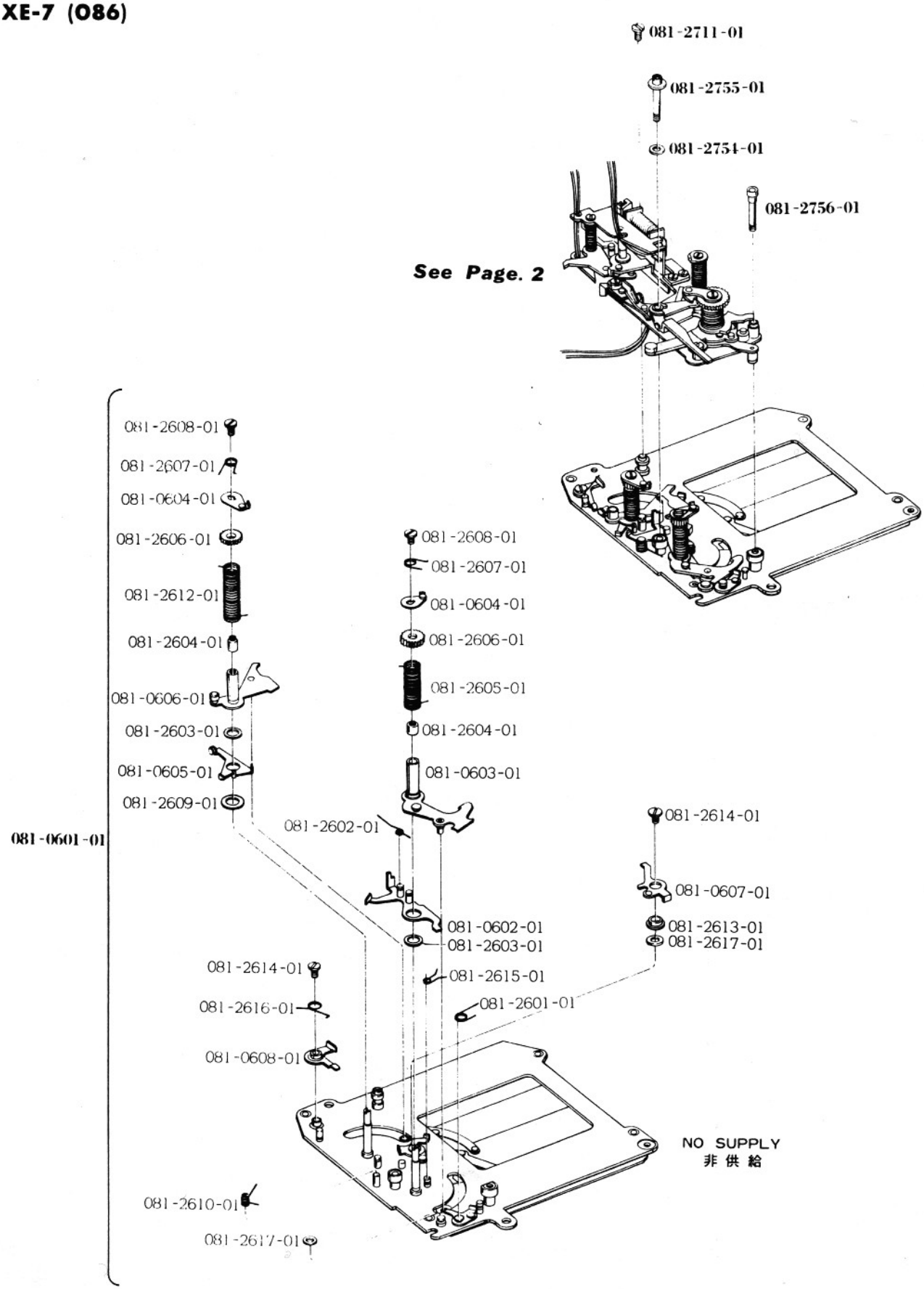
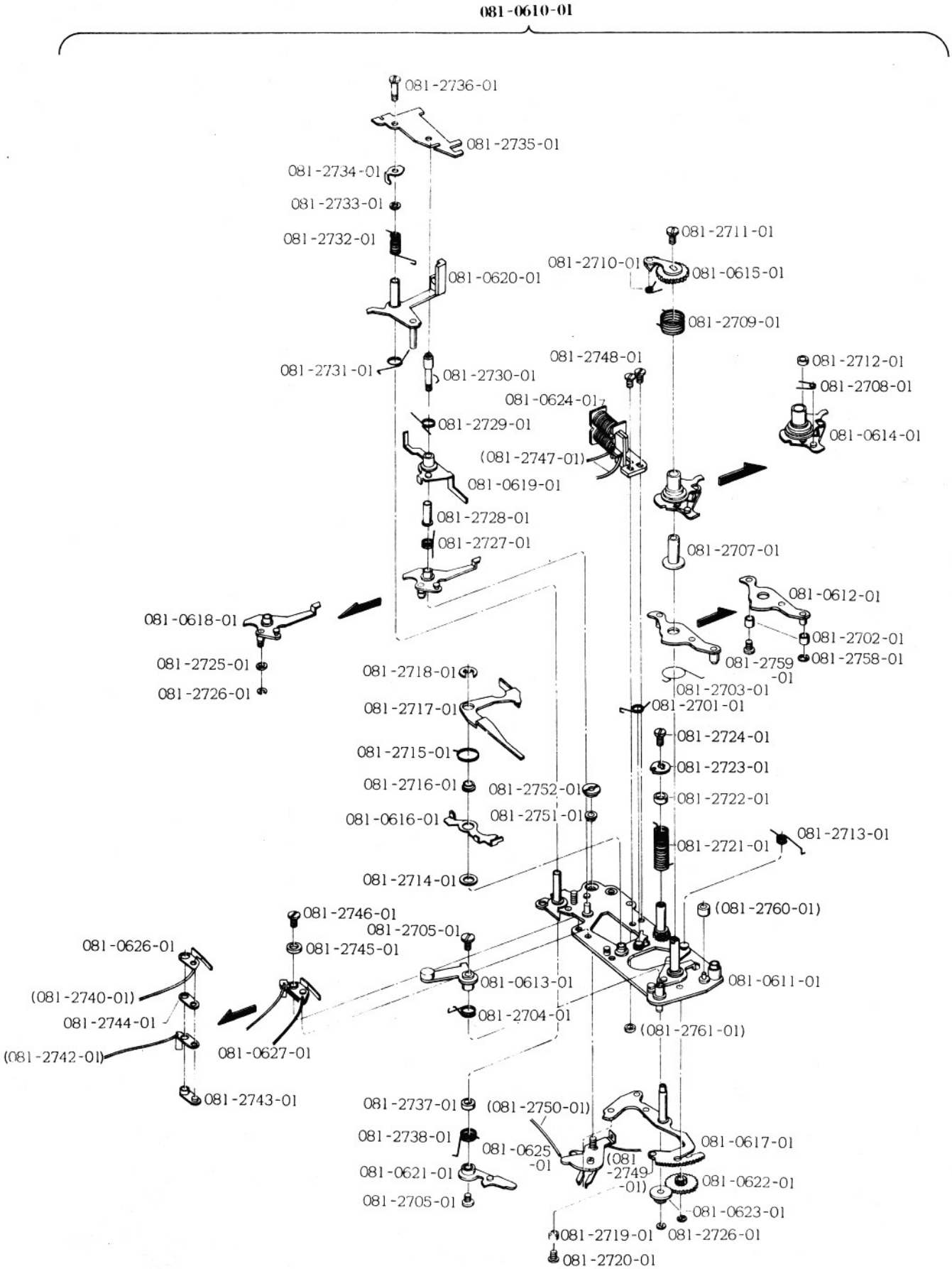
XE (081·084)
XE-1 (082·085)
XE-7 (086)



Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0601-01	Shutter base plate-A set 地板組立	1
081-0602-01	X connecting lever set X連動レバー組立	1
081-0603-01	First blade moving lever set 先羽根駆動アーム組立	1
081-0604-01	Ratchet nail set plate set ラチェット爪取付板組立	2
081-0605-01	X contact lever spring set X接点レバー組立	1
081-0606-01	Second blade moving lever set 後羽根駆動アーム組立	1
081-0607-01	First blade stop lever set 先羽根係止レバー組立	1
081-0608-01	Second blade stop lever set 後羽根係止レバー組立	1
081-2601-01	Bound stop lever B spring バウンド止メレバーBばね	1
081-2602-01	X connecting spring X連動レバーばね	1
081-2603-01	Washer (4.1φ ×0.25) 平座金 (4.1φ ×0.25)	2
081-2604-01	Blade moving spring collar 羽根駆動ばねカラー	2
081-2605-01	First blade moving spring 先羽根駆動ばね	1
081-2606-01	Ratchet tube B ラチェット筒金B	2
081-2607-01	Ratchet nail B spring ラチェット爪Bばね	2
081-2608-01	Blade moving lever set screw 羽根駆動アーム組立ねじ	2
081-2609-01	Washer (4.1φ ×0.1) 平座金 (4.1φ ×0.1)	1
081-2610-01	X contact lever spring X接点レバーばね	1
081-2612-01	Second blade moving spring 後羽根駆動ばね	1
081-2613-01	First blade stop lever collar 先羽根係止レバーカラー	1
081-2614-01	Screw (M1.4×2) 平小ねじ (M1.4×2)	2
081-2615-01	First blade stop lever spring 先羽根係止レバーばね	1
081-2616-01	Second blade stop lever spring 後羽根係止レバーばね	1
081-2617-01	Cusion-A 緩衝片A	2
081-2711-01	Screw (M1.6×3) 平小ねじ (M1.6×3)	1
081-2754-01	Shutter base plate set screw A 上地板取付ねじA	1
081-2755-01	Washer (3.1φ ×0.5) 平座金 (3.1φ ×0.5)	1
081-2756-01	Shutter base plate set screw B 上地板取付ねじB	1

XE (081·084)
XE-1 (082·085)
XE-7 (086)



Part No. 部品番号	Part Name 部品名称	Unit 員数
081-0610-01	Shutter base plate-B block 上地板ブロック組立	1
081-0611-01	Shutter base plate-B set 上地板組立	1
(081-2760-01)	Cusion-C 緩衝片C	(1)
(081-2761-01)	Cusion-D 緩衝片D	(1)
081-0612-01	Set lever set セットレバー下組立	1
081-0613-01	Body release lever set ボデーレリーズレバー組立	1
081-0614-01	Release lever set レリーズレバー組立	1
081-0615-01	Ratchet nail C set plate set ラチェット爪C取付板組立	1
081-0616-01	FP Contact lever set FP接点レバー組立	1
081-0617-01	Control lever set 制御レバー組立	1
081-0618-01	Signal lever set 信号レバー組立	1
081-0619-01	Mech. time operation lever set メカ秒時レバー組立	1
081-0620-01	Iron piece lever set 鉄片レバー組立	1
081-0621-01	Hold lever set ホールドレバー組立	1
081-0622-01	Idle gear set アイドルギヤー組立	1
081-0623-01	Fly wheel set フライホイル組立	1
081-0624-01	Magnet set マグネット組立	1
(081-2747-01)	Lead wire-Black (L－57mm, 0.8φ/13 wires 0.08φ) リード線-黒(L－57mm)	(2)
081-0625-01	Trigger switch base plate set トリガースイッチ基板組立	1
(081-2749-01)	Lead wire-Yellow (L－59mm, 0.8φ/13 wires 0.08φ) リード線-黄(L－59mm)	(1)
(081-2750-01)	Lead wire-Yellow(L－149mm, 0.8φ/13 wires 0.08φ)リード線-黄(L－149mm)	(1)
081-0626-01	FP Contact set FP接片組立	1
(081-2740-01)	Lead wire-Blue (L－278mm, 0.8φ/13 wires 0.08φ) リード線-青(L－278mm)	(1)
081-0627-01	X contact set X接片組立	1
(081-2742-01)	Lead wire-Green (L－287mm, 0.8φ/13 wires 0.08φ) リード線-緑(L－287mm)	(1)
081-2701-01	Ratchet nail-A spring ラチェット爪Aばね	1
081-2702-01	Set lever roller セットレバーローラー	2
081-2703-01	Set lever spring セットレバーばね	1
081-2704-01	Body release lever spring ボデーレリーズレバーばね	1
081-2705-01	Screw (M1.4×2) 平小ねじ (M1.4×2)	2
081-2707-01	Release lever axis レリーズレバー軸	1
081-2708-01	Mirror return hook spring ミラー復元フックばね	1
081-2709-01	Mirror moving spring ミラー駆動ばね	1
081-2710-01	Ratchet nail-C spring ラチェット爪Cばね	1
081-2711-01	Screw (M1.6×3) 平小ねじ (M1.6×3)	1
081-2712-01	Cusion-B 緩衝片B	1
081-2713-01	Lock lever spring ロックレバーばね	1
081-2714-01	Washer (3.7φ×0.17) 平座金 3.7φ×0.17	1
081-2715-01	FP Contact lever spring FP接点レバーばね	1
081-2716-01	Mirror return lever axis ミラー復元レバー軸	1
081-2717-01	Mirror return lever ミラー復元レバー	1
081-2718-01	Coupling washer 割ワッシャー	1
081-2719-01	Roller ローラー	1
081-2720-01	Screw (M1.4×1.6) 平小ねじM1.4×1.6	1
081-2721-01	Control lever spring 制御レバーばね	1
081-2722-01	Collar (2φ×1.5) 間座 (2φ×1.5)	1
081-2723-01	Control lever spring receive plate 制御レバーばね受板	1
081-2724-01	Screw (M1.4×2.5) 平小ねじ (M1.4×2.5)	1
081-2725-01	Signal roller 信号ローラー	1
081-2726-01	Coupling washer 割ワッシャー	3
081-2727-01	Signal lever spring 信号レバーばね	1
081-2728-01	Mech. time lever axis メカ秒時レバー軸	1
081-2729-01	Mech. time lever spring メカ秒時レバーばね	1
081-2730-01	Mech. time lever set screw メカ秒時レバー取付ねじ	1
081-2731-01	Signal stop lever spring 信号係止レバーばね	1
081-2732-01	Iron piece lever spring 鉄片レバーばね	1
081-2733-01	Collar (1.5φ×1.5) 間座 (1.5φ×1.5)	1
081-2734-01	Iron piece lever receive plate 鉄片レバーばね受板	1
081-2735-01	Lead wire receive plate リード線受板	1
081-2736-01	Screw (M1.4×5) 平小ねじ (M1.4×5)	1
081-2737-01	Hold lever spring collar ホールドレバーばねカラー	1
081-2738-01	Hold lever spring ホールドレバーばね	1
081-2743-01	Trigger isolation-B トリガー絶縁座-B	1
081-2744-01	Trigger washer トリガー中間座	1
081-2745-01	Washer (2.2φ×1) ワッシャー (2.2φ×1)	1
081-2746-01	Screw (M1.4×2.9) 平小ねじ (M1.4×2.9)	1
081-2748-01	Screw (M1.6×2.6) 平小ねじ (M1.6×2.6)	2
081-2751-01	Trigger isolation plate トリガー絶縁座	1
081-2752-01	Trigger set nut トリガー取付ナット	1
081-2758-01	Coupling washer 割ワッシャー	1
081-2759-01	Screw (M1.6×3) 平小ねじ (M1.6×3)	1

Disassembly, Assembly and Adjustment of the Shutter

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2. Adjustment of the Shutter Block 4

   [1] Adjustment of the 1st curtain and its speed 5

   [2] Adjustment of the force of the control lever (synchro "FP" time lag.) 5

   [3] Adjustment of the 2nd curtain and its speed 5

   [4] Adjustment of the manual time 5

   [5] Adjustment of the synchro "X" time lag 7

3. Special tool and Sub Material 7

Disassembly & Assembly-1

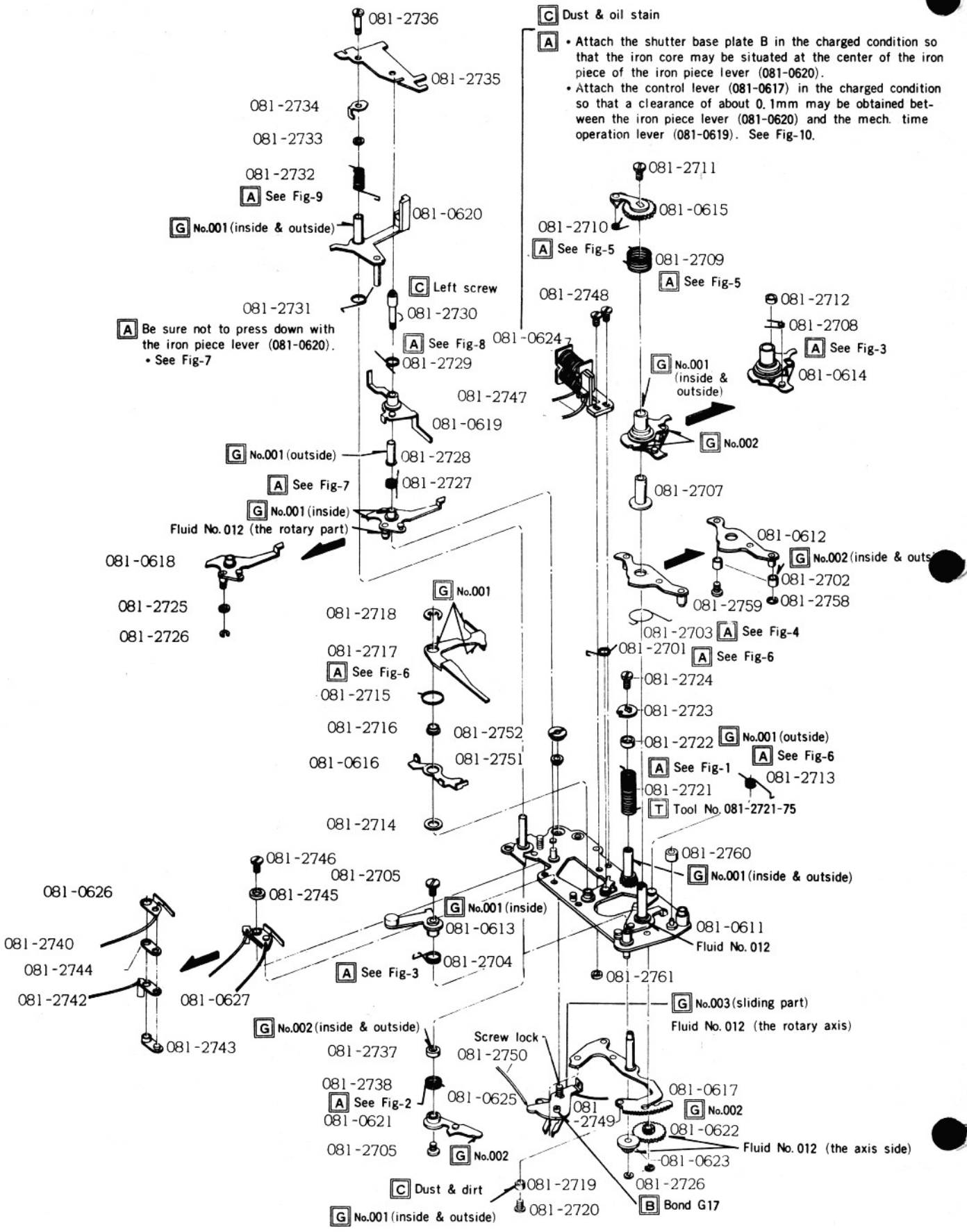
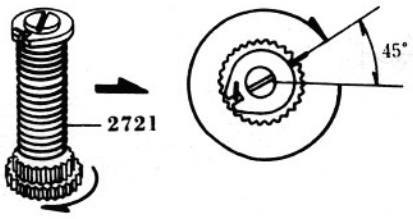


Fig-1



• Using the special tool (Tool No. 081-2721-75), turn the gear round in the direction of the arrow mark, and set it at the position shown in the diagram.

Fig-2

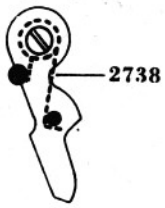


Fig-3

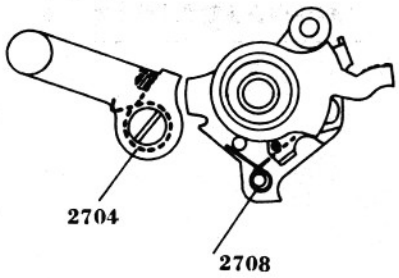


Fig-4

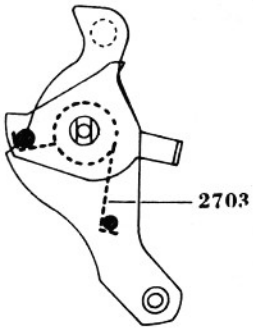


Fig-5

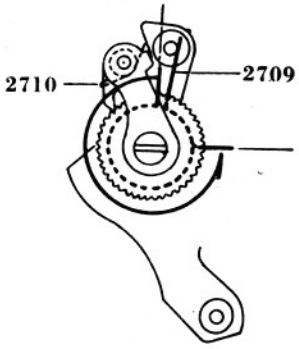
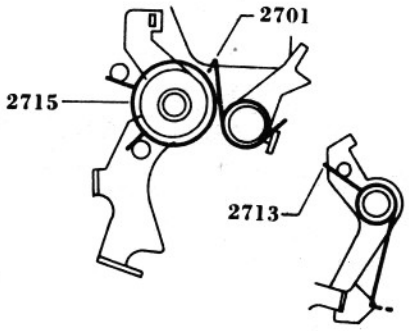


Fig-6



• Turn the gear round in the direction of the arrow mark, and set it as the position shown in the diagram.
• If the spring is strong the body time lag won't be secured.
• If the spring is weak, the mirror won't move up.

Fig-7

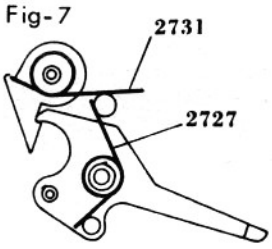


Fig-8

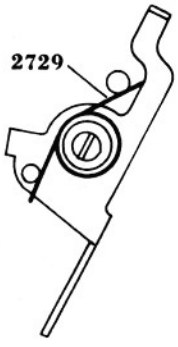
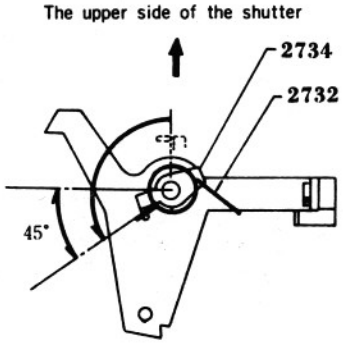
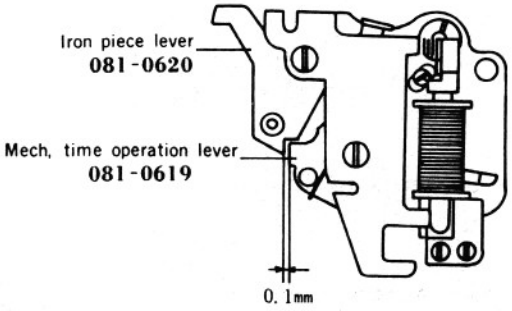


Fig-9

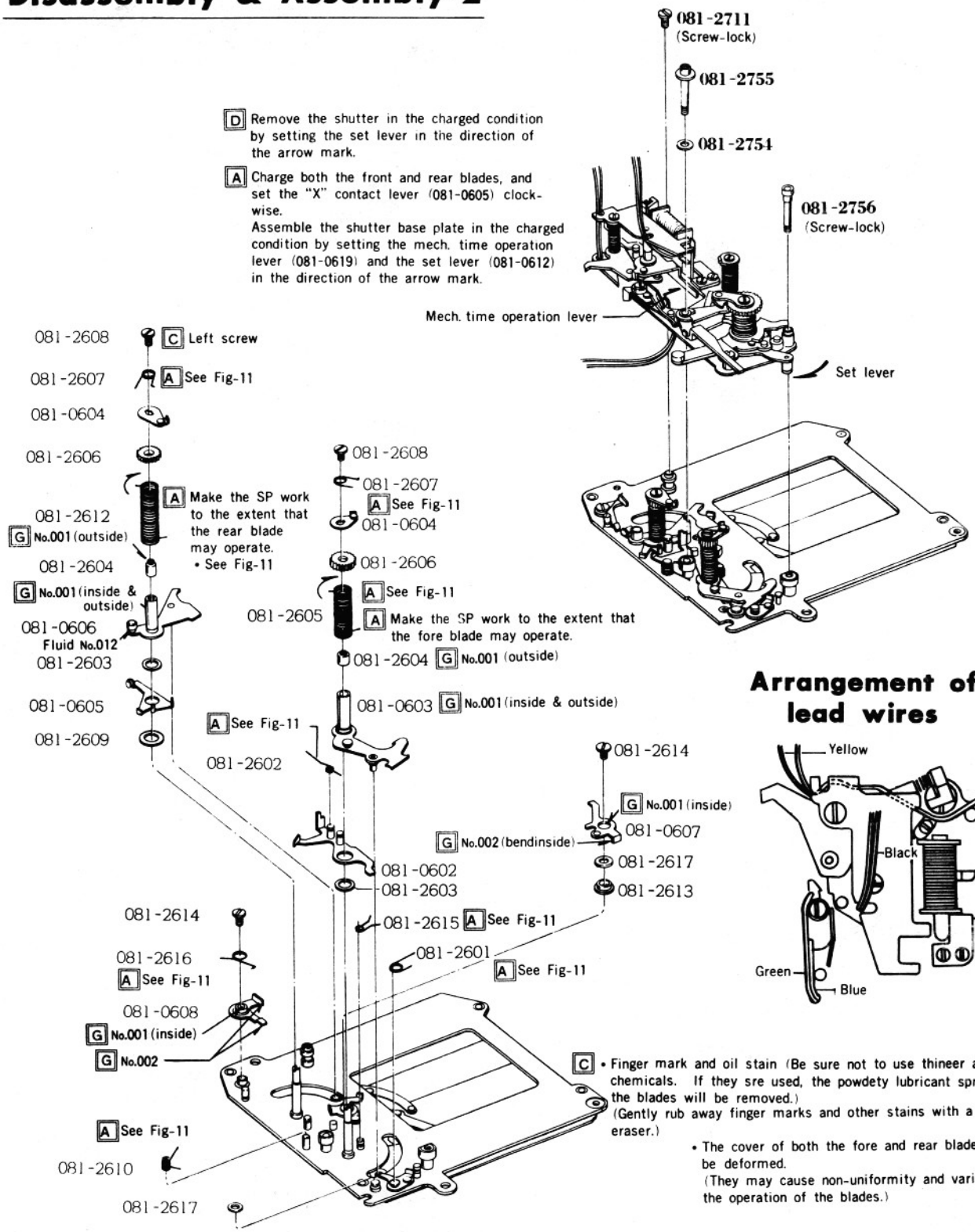


• Turn 2734 round in the direction of the arrow mark, and set it at the position shown in the diagram.
• If the spring is strong, it won't be pushed enough by the hold lever spring (081-2738) and won't be pressed to the Mg.
• If the spring is weak, it may not be uniformly separated the Mg. causing speed variations.

Fig-10



Disassembly & Assembly-2


081-2711 (Screw-lock)
081-2755
081-2754
081-2756 (Screw-lock)
D Remove the shutter in the charged condition by setting the set lever in the direction of the arrow mark.
A Charge both the front and rear blades, and set the "X" contact lever (081-0605) clockwise.
Assemble the shutter base plate in the charged condition by setting the mech. time operation lever (081-0619) and the set lever (081-0612) in the direction of the arrow mark.
Mech. time operation lever
Set lever
081-2608
C Left screw
081-2607
A See Fig-11
081-0604
081-2606
A Make the SP work to the extent that the rear blade may operate. • See Fig-11
081-2612
G No.001 (outside)
081-2604
G No.001 (inside & outside)
081-0606
Fluid No.012
081-2603
081-0605
081-2609
081-2608
081-2607
A See Fig-11
081-0604
081-2606
A See Fig-11
081-2605
A Make the SP work to the extent that the fore blade may operate.
081-2604 G No.001 (outside)
081-0603 G No.001 (inside & outside)
A See Fig-11
081-2602
081-2614
G No.001 (inside)
G No.002 (bendinside)
081-0607
081-2617
081-2613
081-0602
081-2603
081-2615 A See Fig-11
081-2601
A See Fig-11
081-2614
081-2616
A See Fig-11
081-0608
G No.001 (inside)
G No.002
A See Fig-11
081-2610
081-2617
C • Finger mark and oil stain (Be sure not to use thineer and other chemicals. If they sre used, the powdety lubricant sprayed on the blades will be removed.)
(Gently rub away finger marks and other stains with a rubber eraser.)
• The cover of both the fore and rear blades tend to be deformed.
(They may cause non-uniformity and variations in the operation of the blades.)

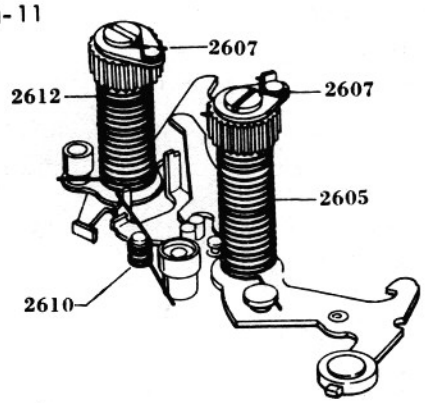
Arrangement of lead wires

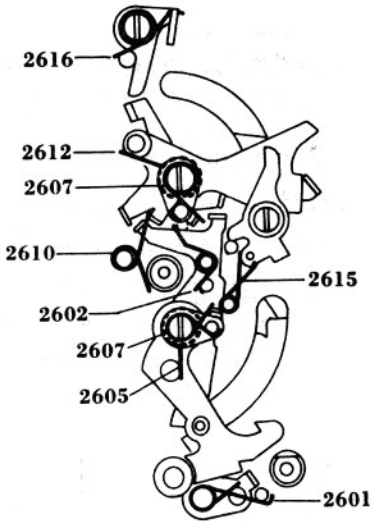
■After assembly: Attach the shutter block to the body, and then attach the shutter base plate (081-0270) and the winding lever (081-0340). (See Page. 13~15 of the disassembly, assembly, and adjustment manual.)

■Confirmation:

1. Operation of the mech. shutter.
   Set the speed dial to "B" and "X", and then release the shutter. Be sure to confirm that the rear blade is locked at "B", while the shutter opens at "X".
2. Confirm the attractive force of the Mg.
   (See Page. 49 of the disassembly, assembly, and adjustment manual.)

Fig-11





■Adjustment of the Shutter Block

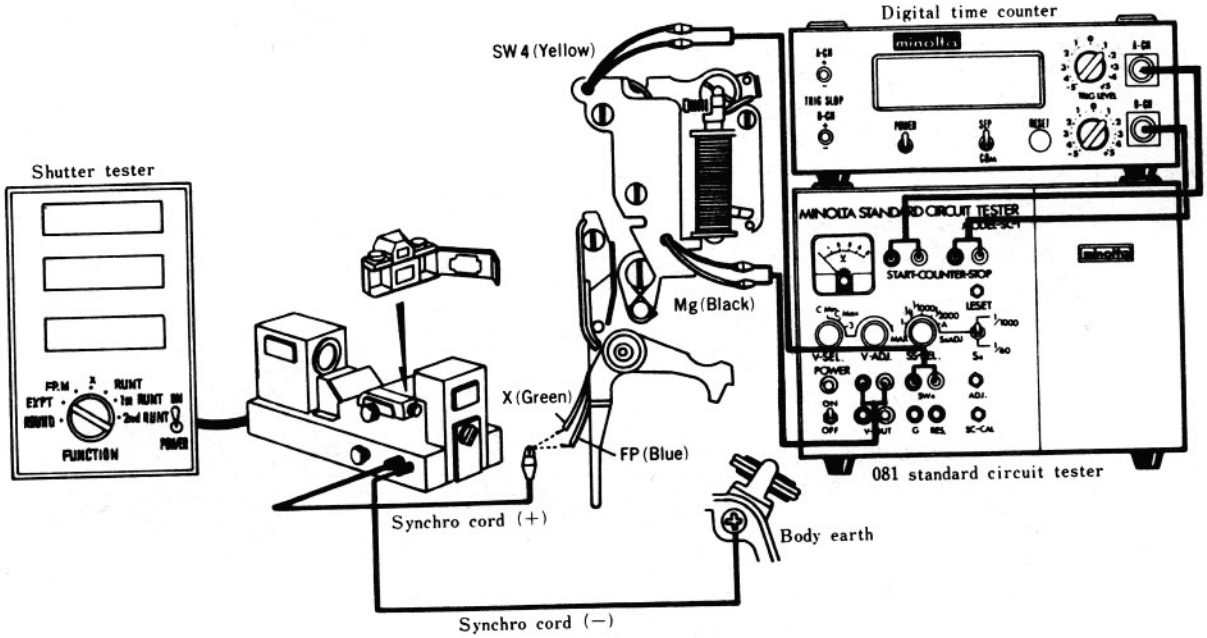
■Items to be Adjusted

1. Adjustment of the 1st curtain and its speed.
2. Adjustment of the force of the control lever (synchro "FP" time lag.)
3. Adjustment of the 2nd curtain and its speed.
4. Adjustment of the manual time.
5. Adjustment of the synchro "X" time lag.

■Testers

The 081 standard circuit meter (Model SC-1)
The digital time counter (Model TC-1)
The shutter tester

■Diagram of the connections between the testers and the shutter block



1 Adjustment of the 1st curtain and its speed

■Standard Value: Shutter tester 21mm 6.0ms.

■How to Adjust:

1. Connect the lead wires of SW. 4 and Mg of the shutter block as shown in the diagram of the connections between the testers and the shutter block, and set the testers as explained below:

●081 Standard Circuit Tester	●Shutter Tester
SS SEL: 1/1000	Curtain running direction: Down
V SEL: 3.0V	Function: Run. T or 1st Run. T

2. Set the speed dial at a position other than "B" and "X", and adjust the 1st blade driving spring so that the shutter may show the standard value when released by pressing "RESET" SW of the 081 standard circuit tester.
   The fore blade driving spring will be changed up to about 0.1 ms by the gear 1.

2 Adjustment of the force of the control lever (Synchro "FP" time lag)

■Standard Value: 14 ms (11~15 ms)

■How to Adjust:

1. Connect the lead wires of SW. 4 and Mg of the shutter block and those (blue) of the synchro "FP" as show in the diagram of the connections between the testers and the shutter block, and set the testers as explained below:

●081 Standard Circuit Tester	●Shutter Tester
SS SEL: 1/1000	Curtain running direction: Down
V SEL: 3.0V	Function: FP

2. Set the speed dial at a position other than "B" and "X", and adjust the control lever spring so that the shutter may show the standard value (14 ms) when released by pressing "RESET" SW of the 081 standard circuit tester. The time lag will be come shorter when the control lever spring is made stronger, and vice versa.

3 Adjustment of the 2nd curtain and its speed

■Standard Value: Shutter tester 21mm 6.0 ms

■How to Adjust:

1. Connect the lead wires of SW. 4 and Mg of the shutter block as shown in the diagram of the connections between the testers and the shutter block, and set the testers as explained below:

●081 Standard Circuit Tester	●Shutter Tester
SS SEL: 1/1000	Curtain running direction: Down
V SEL: 3.0V	Function: Run. T or 2nd Run. T

2. Set the speed dial at a position other than "B" and "X", and adjust the 2nd blade driving spring so that the shutter may show the standard value when released by pressing "RESET" SW of the 081 standard circuit tester.
   The 2nd blade driving spring will be changed up to about 0.1 ms by the gear 1.
3. Set the shutter tester to "Function: EXP. T", and release the shutter.
   In this case make a readjustment so that the measured value of the "A" range may become equal to that of the "C" range.

4 Adjustment of the manual time

■Standard Value:

"SS SEL" Set position of 081 Standard Circuit Tester	Indication of Shutter Tester		CR Time
	Standard Value	Allowable Value	
1/1	1000 ms	758~1320 (±0.4EV)	1 s
1/4	250 ms	189~330 (±0.4EV)	251 ms
1/1000	0.98 ms	0.91~1.05 (±0.1EV)	2 ms

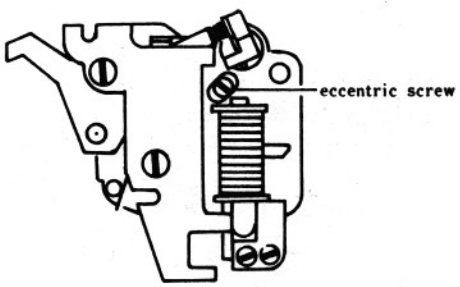
Note: The allowable value is the central value of the tester.
Refer to the inspection standards for variations.

■How to Adjust:

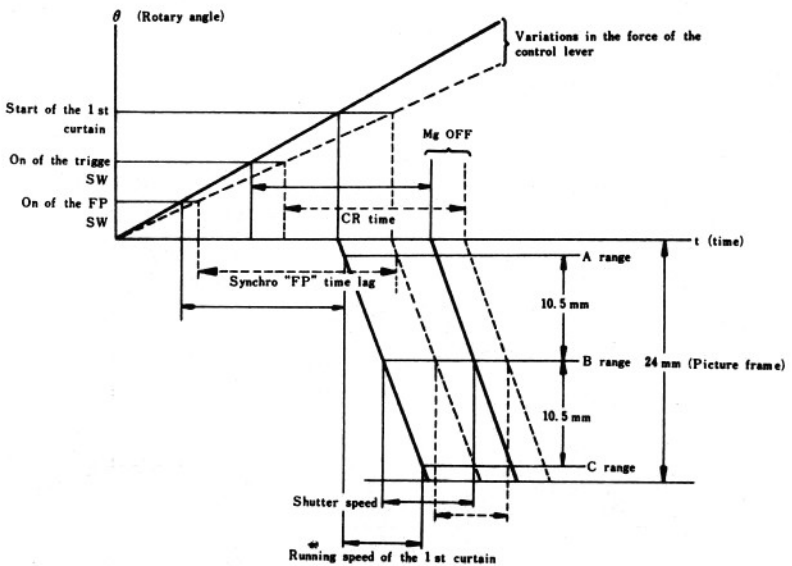
1. Connect the lead wires of SW. 4 and Mg of the shutter block as shown in the diagram of the connections between the testers and the shutter block, and set the testers as expleined below:

- **081 Standard Circuit Tester**
  SS SEL: 1/1000 (1/4, 1/1)
  V SEL: 3.0V
- **Shutter Tester**
  Curtain running direction: Down
  Function: EXP. T
- **Digital Time Counter**
  SEP-COM SW: SET
  Trigger level: A-CH: +1 (V)
  B-CH: +1 (V)
  Trigger slope: A-CH: +
  B-XH: +

2. Set the speed dial at a position other than "B" and "X", and set the 081 standard circuit tester to "SS SEL: 1/1000". Then adjust the eccentric pin of the trigger switch so that the shutter may show a value close to the standard value (0.98 ms) when released by pressing "RESET" SW.
   The Value will be come smaller when the eccentric pin is turned clockwise, and vice versa.
3. If no adjustment is possible with the trigger switch, readjust the force of the control lever (within the standards of the synchro "FP" time lag) so that the value may become close to the standard value (0.98 ms).
4. Set the 081 standard circuit tester to "SS SEL: 1/4, 1/1", and confirm that the shutter shows a value within the standard value range when it is released, as is the case with 1/1000.
   Note: The indication of the digital time counter varies a little depending on the chattering of SW. 4.



■Relations between variations in the force of the control lever on one hand and the shutter speed on the other.



5 Adjustment of the synchro "X" time lag

■ Standard Value: A range: Over 0.4 ms B range: Over 2.0 ms

■ How to Adjust:

1. Connect the synchro "X" lead wire of the shutter block as shown in the diagram of the connections between the testers and the shutter block, and set the shutter tester to "Curtain running direction: Down Function: X".
   (Keep the 081 standard circuit tester at "Power: Off".)
2. Set the shutter dial to "X", and bend and adjust the "X" contact piece so that the shutter may show the standard value at the "A" range when it is released. In this case, confirm that the value measured at the "B" range remains within the standard value range.

■ Special Tool

■ Tool No. 081-2721-75

Ratchet charge tool

■ Sub Material

■ GREASE

- Grease No. 001 (White)
- Grease No. 002 (Black)
- Grease No. 003 (Yellow)

■ OTHERS

- Fluid No. 012 (oil)

■ BINDING AGENT ↔ SOLVENT

- Bond G17 ↔ Thinner

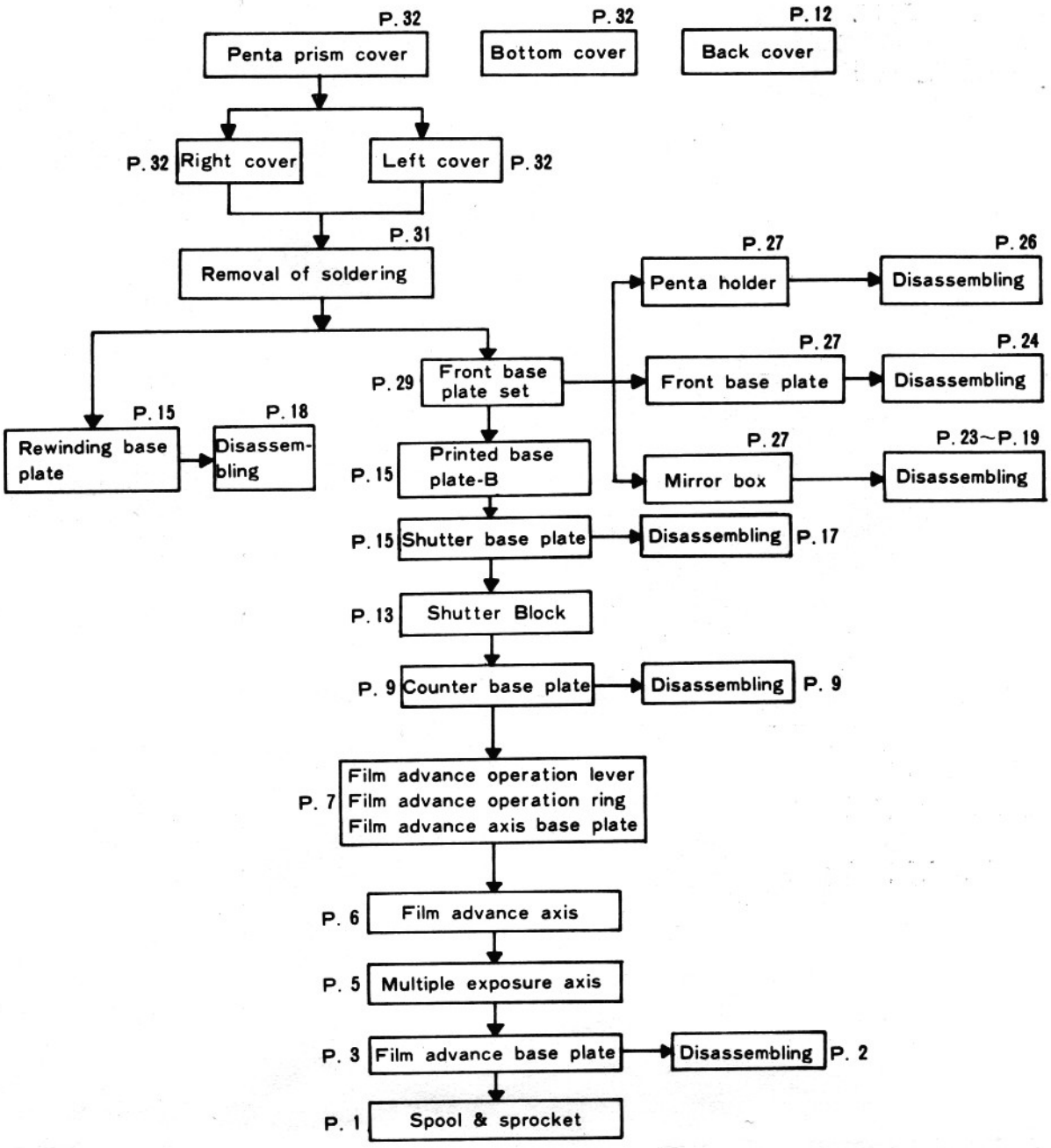
Disassembly, Assembly and Adjustment

■For disassembly, refer to the related pages in the reverse order as the contents of this manual are arranged in the order of procedures for assembling and adjusting.

— Abbreviations —

[D] : Disassembly note and reference.
[A] : Assembly note and reference.
[T] : Special tool No. and where to use it.
[G] : Grease to be used and where to apply it.
[B] : Bond to be used and where to bind.
[C] : Caution in general.

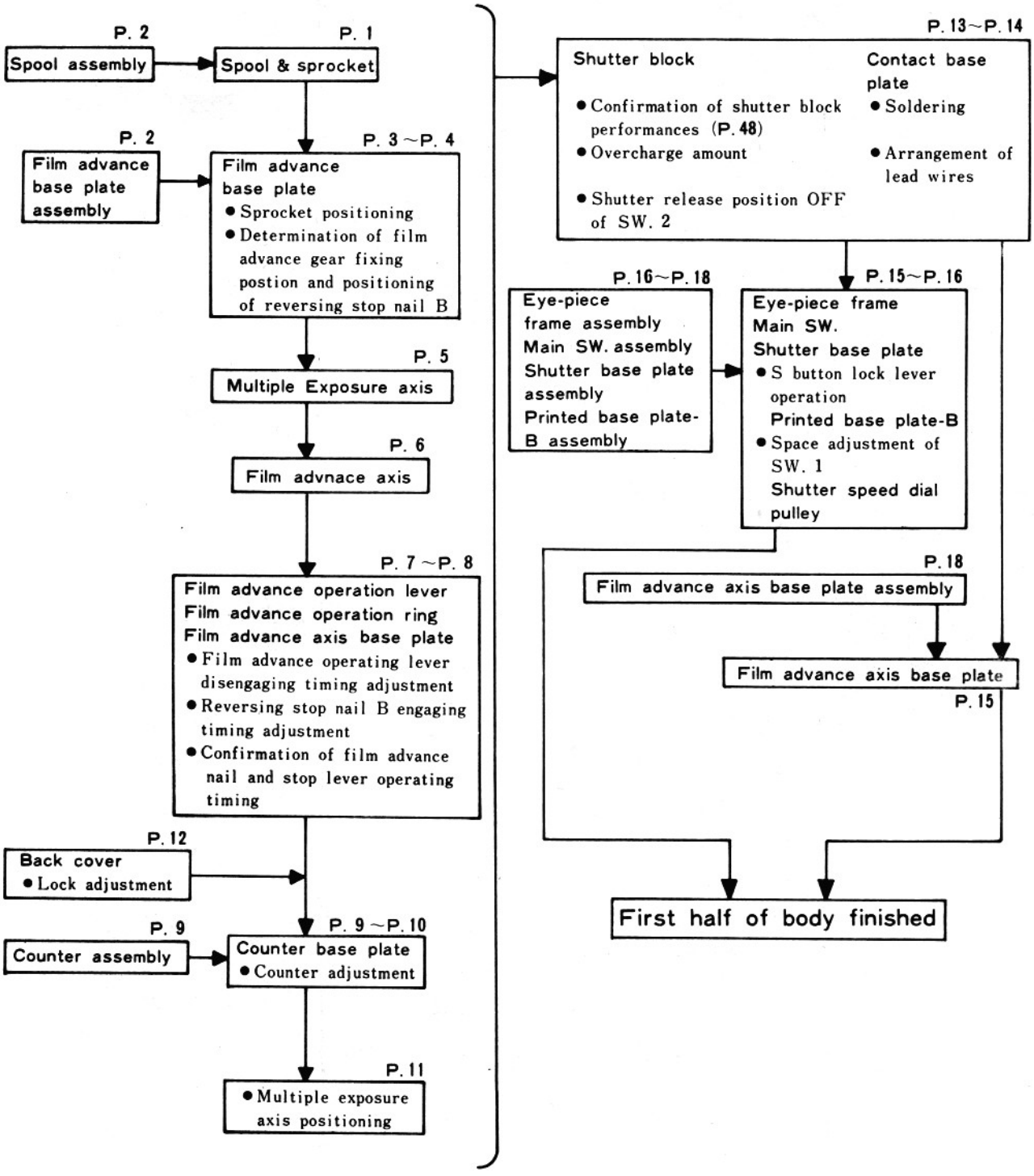
■Disassembling Procedures Chart



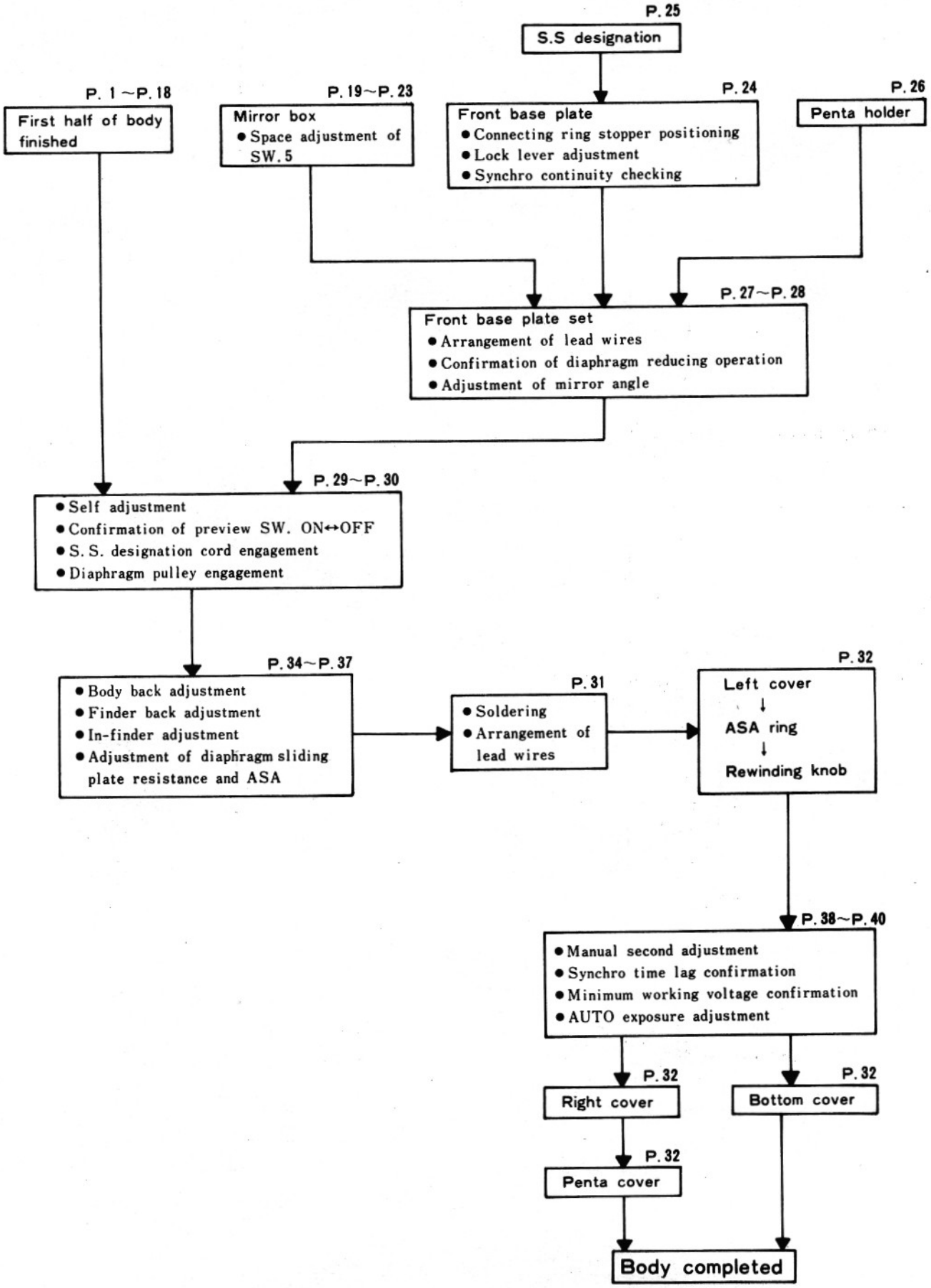
For assembling and adjustment procedure chart see next page.

■Assembling/Adjustment Procedures Chart

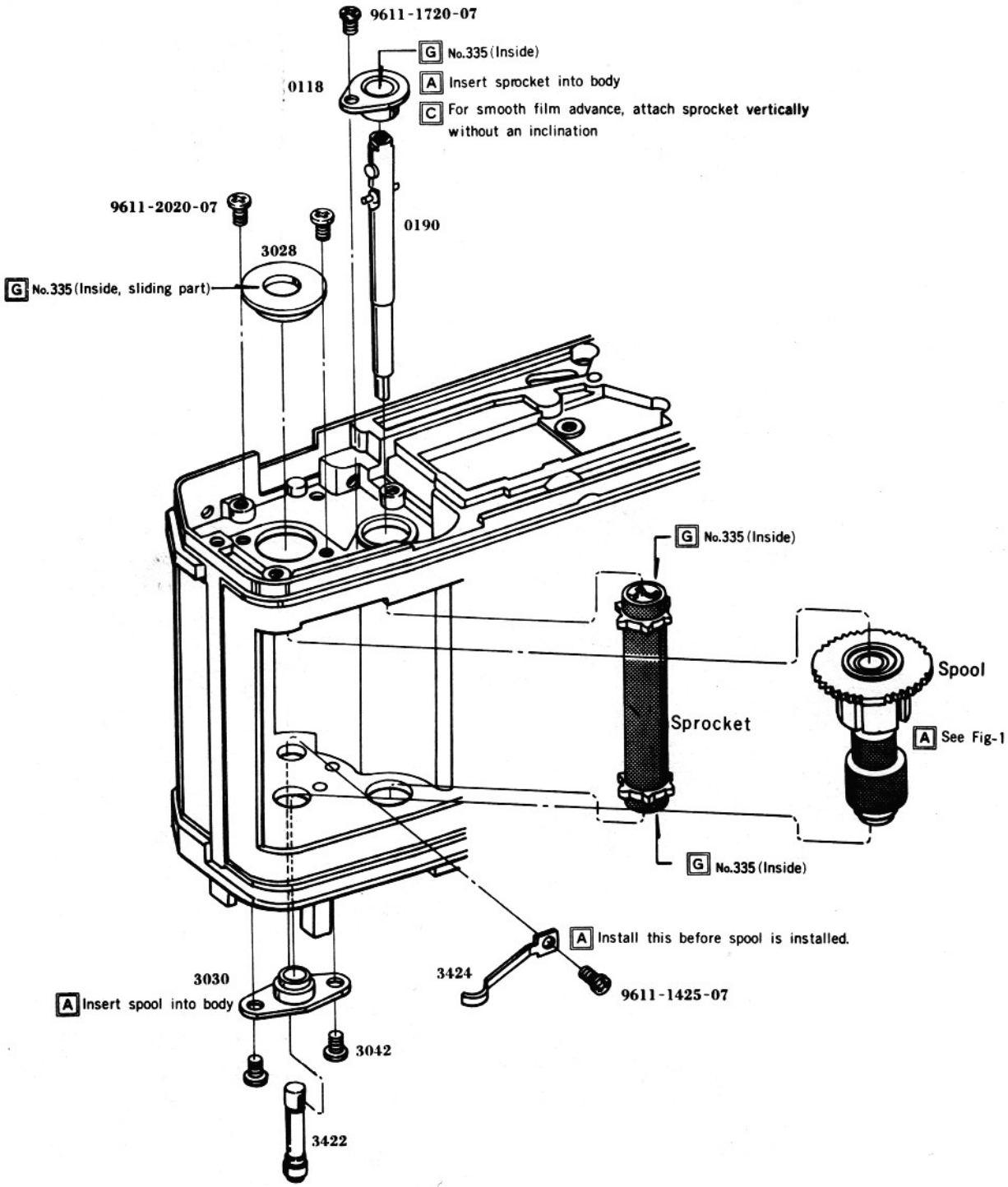
■First half of body


P. 2
Spool assembly
P. 1
Spool & sprocket
P. 2
Film advance base plate assembly
P. 3 ~ P. 4
Film advance base plate
● Sprocket positioning
● Determination of film advance gear fixing postion and positioning of reversing stop nail B
P. 5
Multiple Exposure axis
P. 6
Film advnace axis
P. 7 ~ P. 8
Film advance operation lever
Film advance operation ring
Film advance axis base plate
● Film advance operating lever disengaging timing adjustment
● Reversing stop nail B engaging timing adjustment
● Confirmation of film advance nail and stop lever operating timing
P. 12
Back cover
● Lock adjustment
P. 9
Counter assembly
P. 9 ~ P. 10
Counter base plate
● Counter adjustment
P. 11
● Multiple exposure axis positioning
P. 13 ~ P. 14
Shutter block
● Confirmation of shutter block performances (P. 48)
● Overcharge amount
● Shutter release position OFF of SW. 2
Contact base plate
● Soldering
● Arrangement of lead wires
P. 16 ~ P. 18
Eye-piece frame assembly
Main SW. assembly
Shutter base plate assembly
Printed base plate-B assembly
P. 15 ~ P. 16
Eye-piece frame
Main SW.
Shutter base plate
● S button lock lever operation
Printed base plate-B
● Space adjustment of SW. 1
Shutter speed dial pulley
P. 18
Film advance axis base plate assembly
Film advance axis base plate
P. 15
First half of body finished

■Second half of body to completion of body

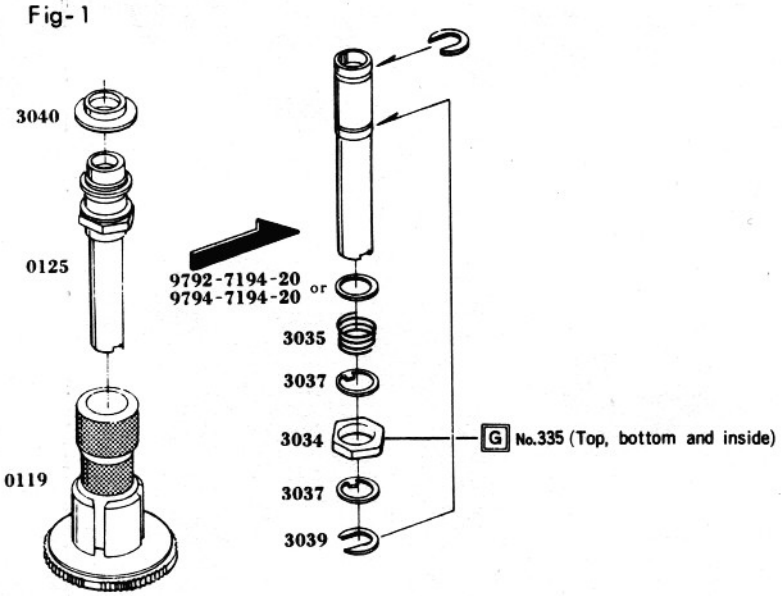


Body 1 Spool & Sprocket



■Spool

Fig-1



■Film Advance Base Plate

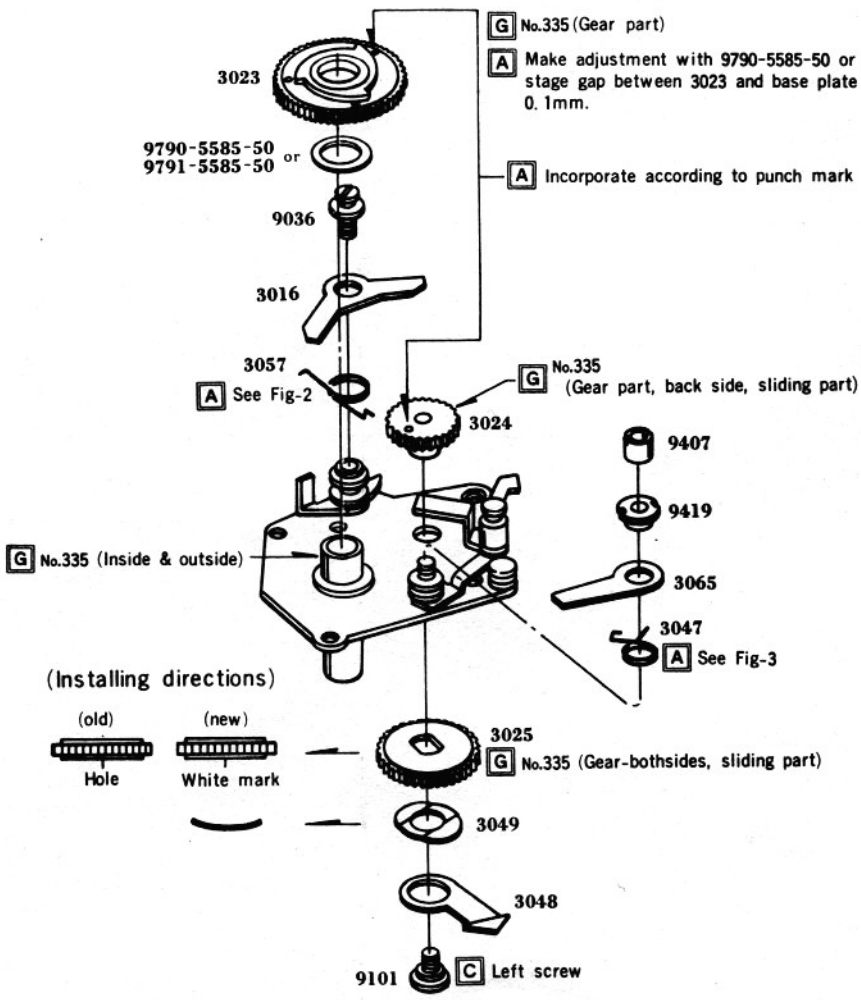


Fig-2
How to engage 3057 SP

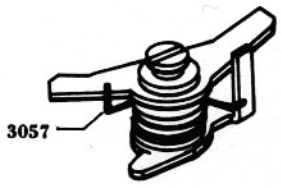
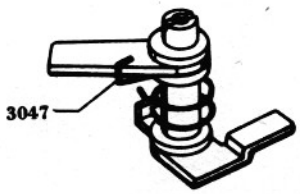
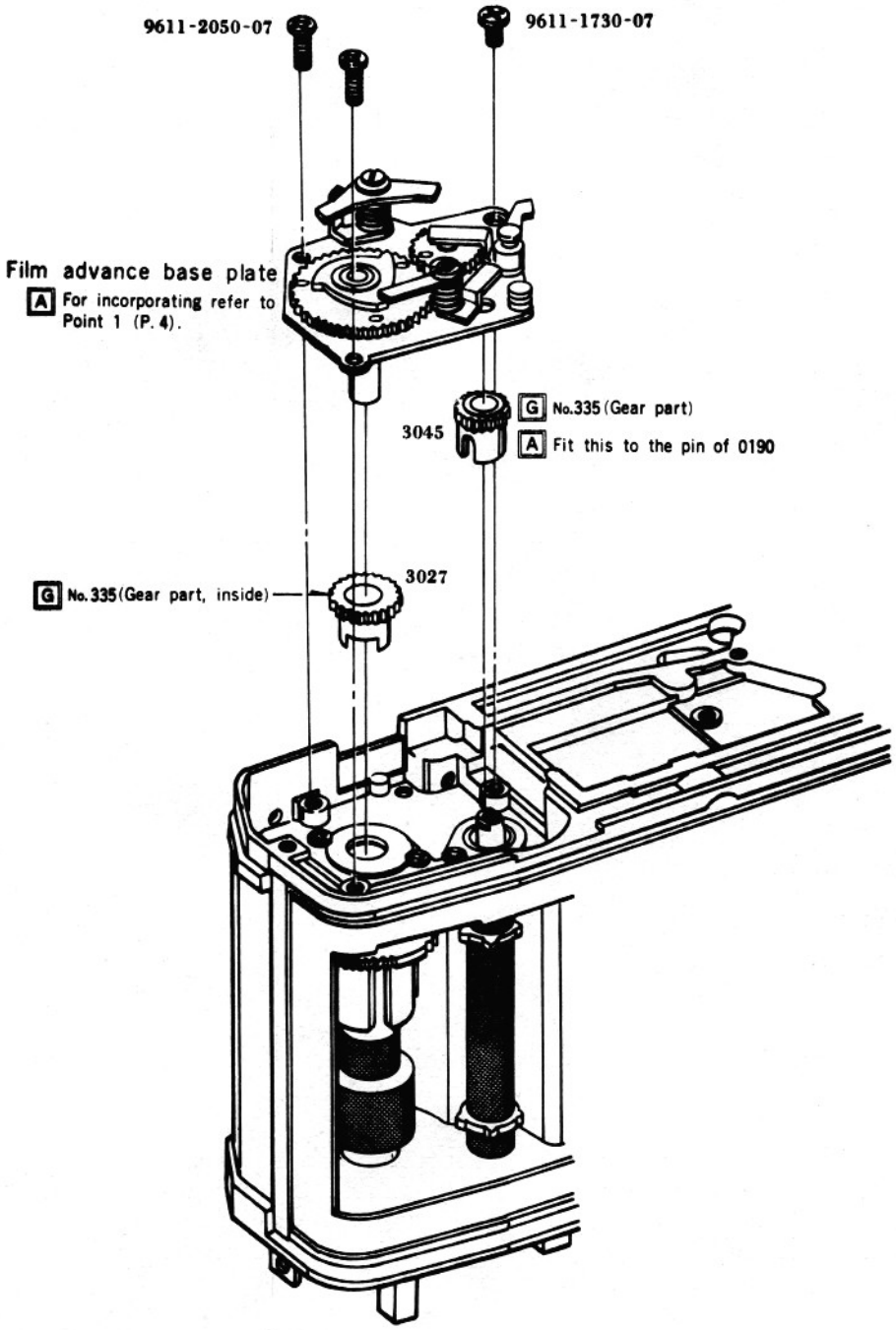


Fig-3
How to engage 3047 SP

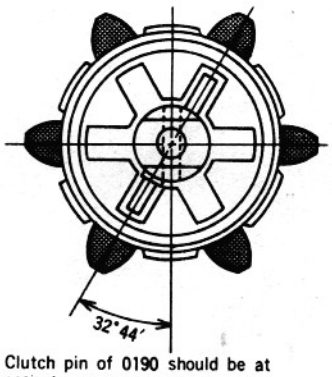


Body 2 Film Advance Base Plate

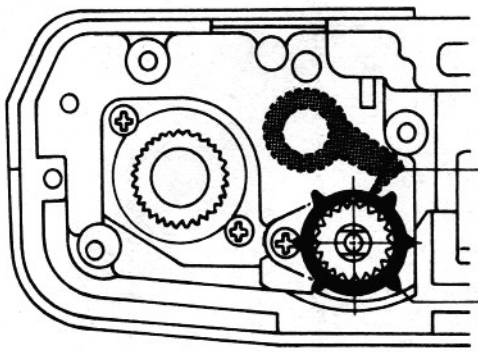


POINT-1 Incorporating Film Advance Base Plate and Positioning of Sprocket

With the body in the condition shown in the following figure, incorporate the film advance base plate set (with punch mark of gear fit) into the body. The sprocket axis should be pushed up with your finger.



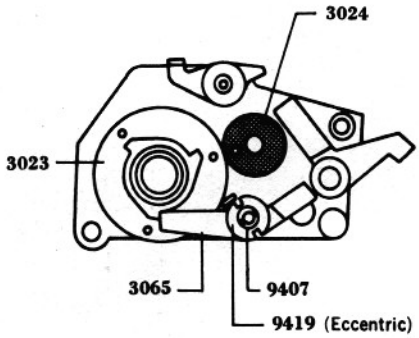
Clutch pin of 0190 should be at 32°44′ with body


When film advance base plate is attached, set the reversing stop nail A (3048) in the position shown in the figure.
Position of sprocket nail

After incorporating, determine the mounting position of film advance gear and position the reversing stop nail B.

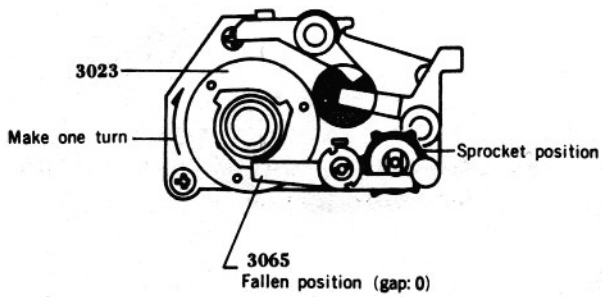
■Mounting Position of Film Advance Gear and Position of Reversing Stop Nail B

As shown in the figure to right, adjust the reversing stop nail collar (9419; eccentric) into the position where film advance gear (3023) connects with the reversing stop nail B (3065) and fits into the groove of the gear. Clamp it with 9407.
After the adjustment, check as follows:



■Checkup after adjustment

Turn the spool once clockwise, and make sure that the sprocket (3041) is in the position shown in the figure at the right in which the reversing stop nail B (3065) has fallen into the film advance gear (3023).



Body 3 Multiple Exposure Axis

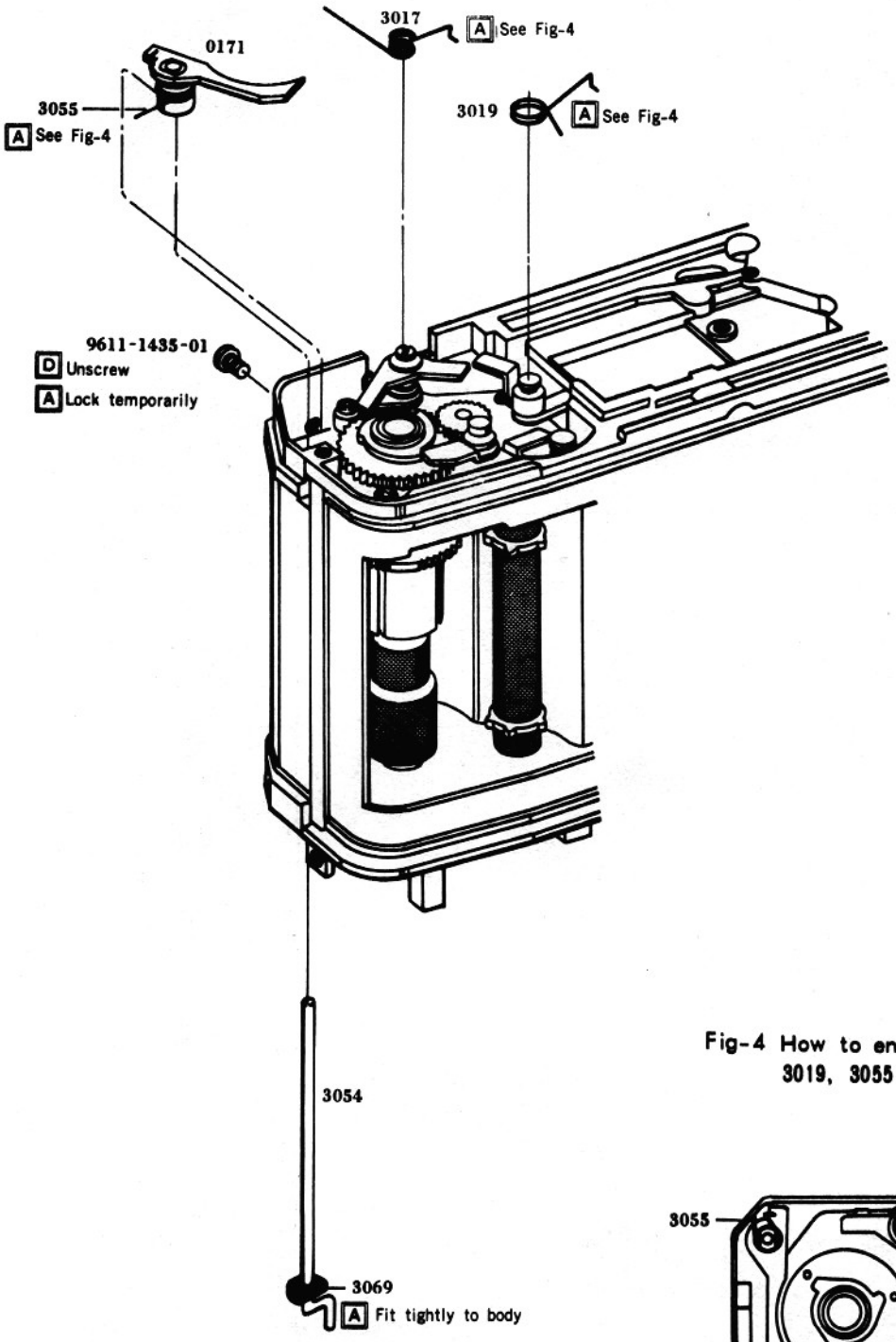
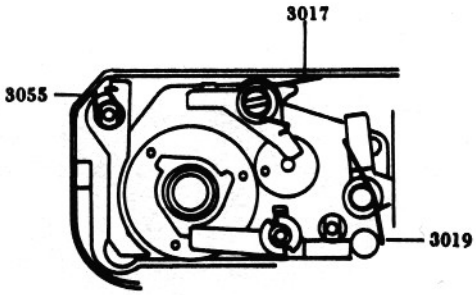


Fig-4 How to engage 3071 3019, 3055 SP.



■Multiple exposure axis should be positioned after the counter base plate is incorporated.

Body 4 Film Advance Axis

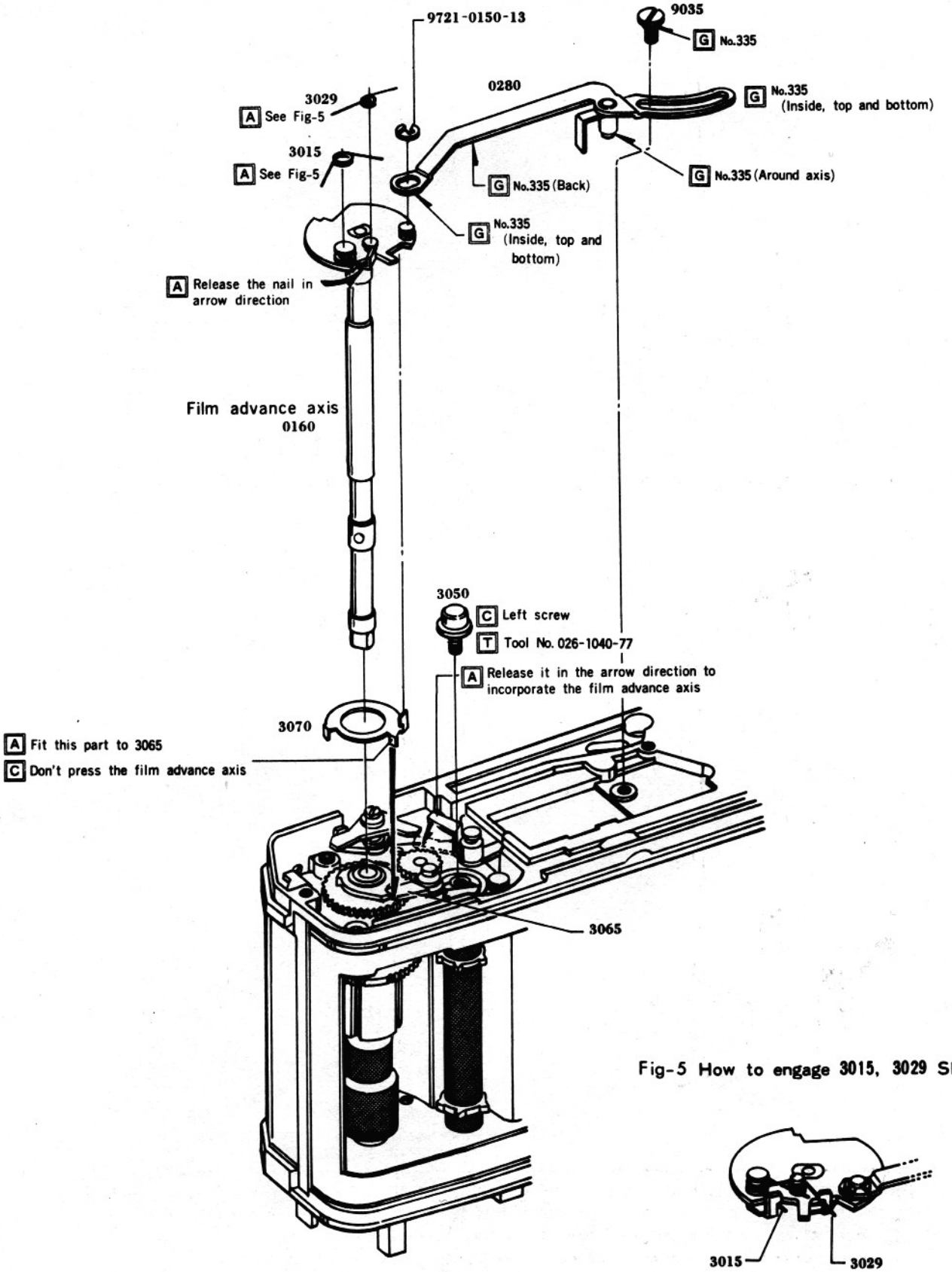


Fig-5 How to engage 3015, 3029 SP

Body-5 Film Advance Operation Lever, Film Advance Operation Ring and Film Advance Axis Base Plate

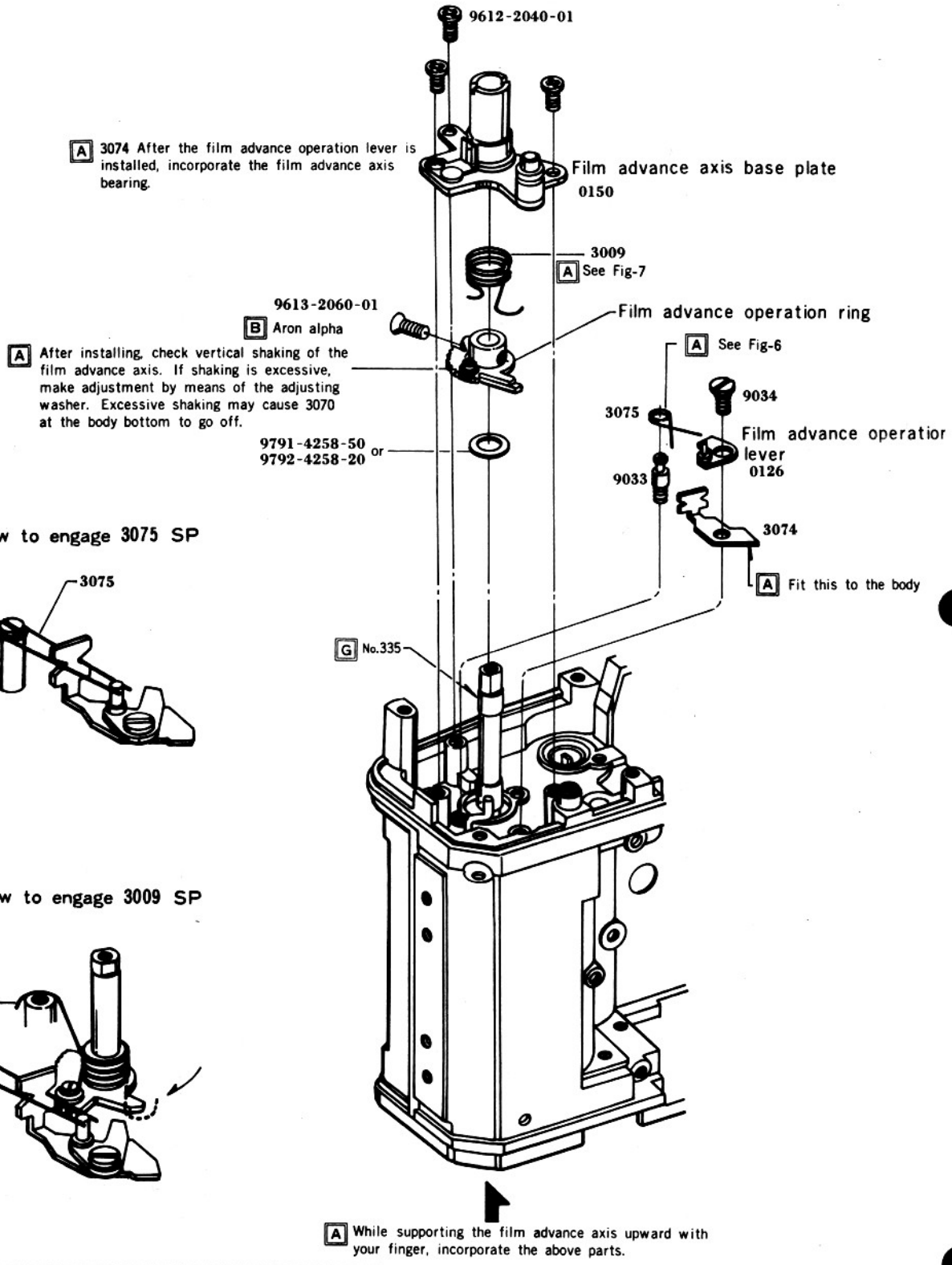
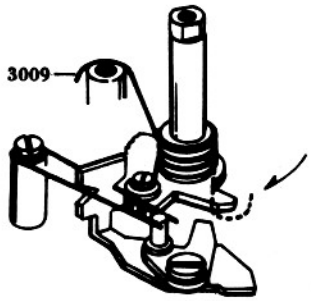

9612-2040-01
A 3074 After the film advance operation lever is installed, incorporate the film advance axis bearing.
Film advance axis base plate
0150
3009
A See Fig-7
9613-2060-01
B Aron alpha
Film advance operation ring
A After installing, check vertical shaking of the film advance axis. If shaking is excessive, make adjustment by means of the adjusting washer. Excessive shaking may cause 3070 at the body bottom to go off.
A See Fig-6
9034
3075
Film advance operatior lever
0126
9033
9791-4258-50
9792-4258-20
or
3074
A Fit this to the body
G No.335
A While supporting the film advance axis upward with your finger, incorporate the above parts.

Fig-6 How to engage 3075 SP

Fig-7 How to engage 3009 SP



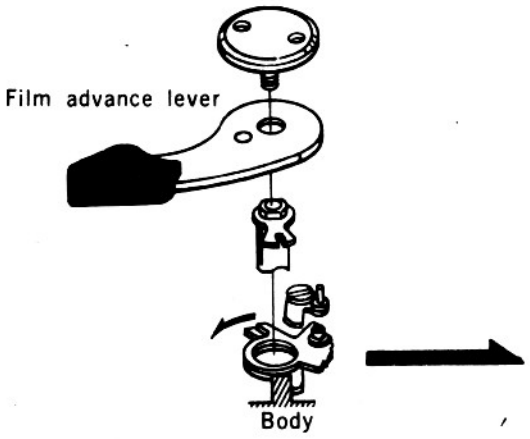
■After assembling, make the following adjustments: (refer to next page 18)

- Adjustment of film advance operation lever disengagement timing.
- Adjustment of reversing stop nail B engagement timing.
- Checkup of operation timing of film advance nail and film advance stop lever.

■Adjustment of Film Advance Operation Lever Disengagement Timing

- Purpose and caution:
  This adjustment is to release the film advance lever (3007) at the same time as the completion of winding.
  - Releasing too quickly will cause undercharge.
  - Releasing too slowly will cause the film advance lever not to return.
- Preparation: Temporarily set the film advance lever
- Procedure: Carry out the adjustment according to the following procedures.

■Before winding up condition



■Condition at the completion of winding up

① In the state of completion of film advance, loosen 9037 and release 0126

② Push 3007 in the arrow direction as in the figure below and press it to the oval hole.

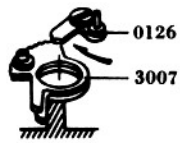
③ Push 0126 in the arrow direction as in the figure below, move it until 3007 is removed, and tighten 9037.

④ Wind up again and check that 0126 is released just before the winding up is completed. Afterward, tighten the lock screw at 9037.

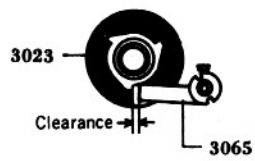
■Adjustment of Reversing Stop Nail B Engagement Timing

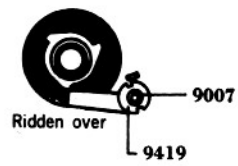
① Complete winding up.

② Push 0126 in the arrow direction and release the film advance lever as 3007 is contacted.



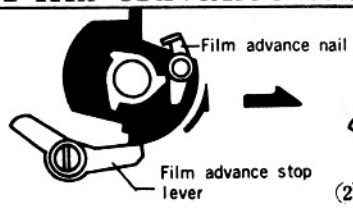
③ With the body bottom up, if 3065 is in either of the situations shown below in relation to 3023, loosen 9007 and make the clearance 0 by means of eccentric adjustment.





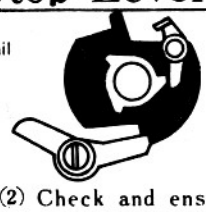
④ **Confirmation:**
0126 should be able to be released after winding up and 3065 being engaged with 3023, or at the same time thereof.

■Checking of Operation Timing of Film Advance Nail and Film Advance Stop Lever

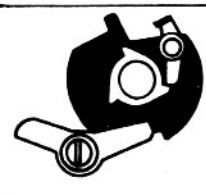


① Restore to the original state gradually from the wound up state.

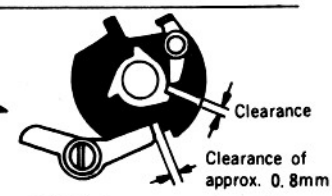
■Lower side of body



② Check and ensure that the film advance nail is in the position shown above in which the film advance stop lever is engaged with the first notch.



③ Make sure that the film advance nail falls within the range where the film advance stop lever falls into the second notch.



④ Make sure that the film advance lever is in the completely returned position as shown above.

Body 6 Counter Base Plate

■Counter base plate

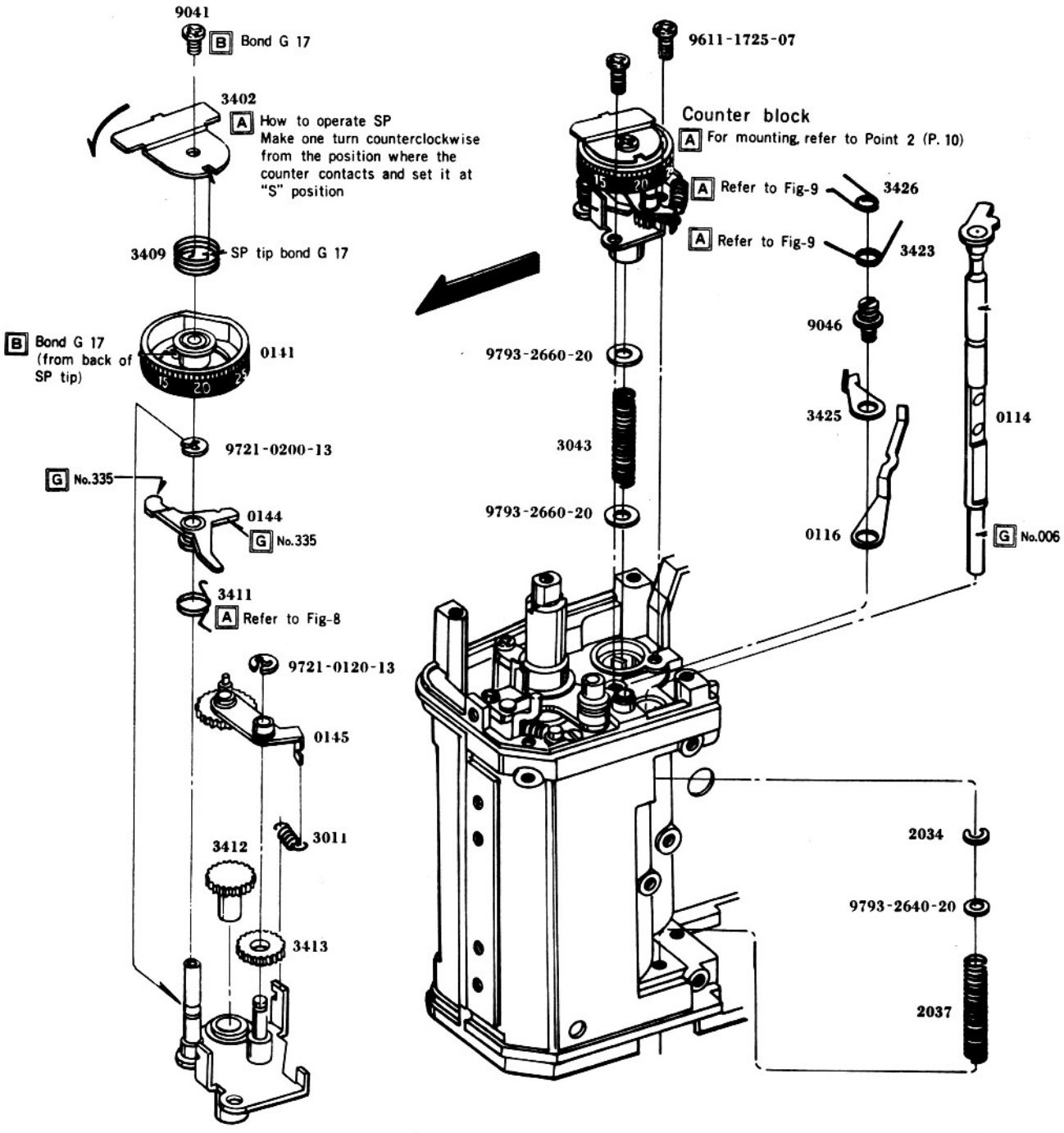


Fig-8 How to engage 3411 SP

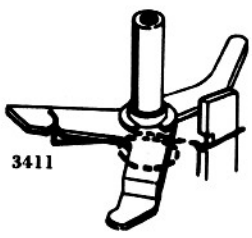
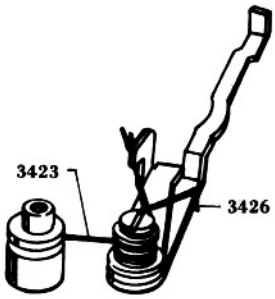
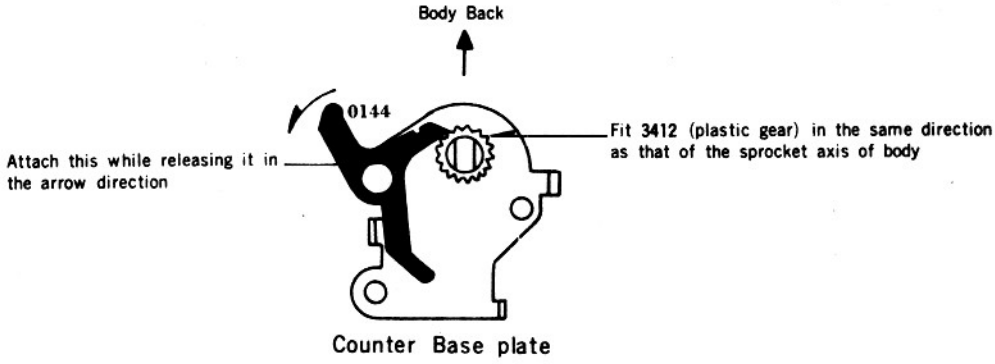


Fig-9 How to engage 3423, 3426 SP



POINT-2 Incorporating of Counter Block

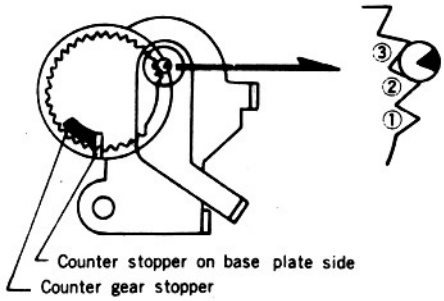
■Incorporate it according to the procedures shown in the figure below.

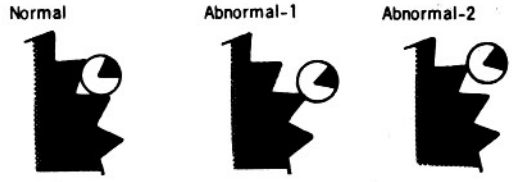

Body Back
0144
Fit 3412 (plastic gear) in the same direction as that of the sprocket axis of body
Attach this while releasing it in the arrow direction
Counter Base plate

■Confirmation after installing (Counter adjustment)

Carry out confirmation with the back cover closed. (For attaching the back cover, refer to P. 12)

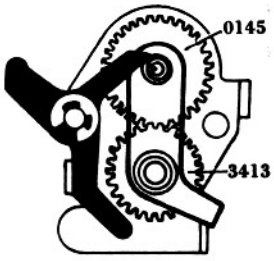
• Confirmation-1: Check that ⓥ (V groove pin) is in the second rut of counter gear in the position "S".





In case of Abnormal-1 and -2, bend the counter stopper to make adjustment.

• Confirmation-2: Check that the direction of ⓥ (V groove pin) is as shown in the figure below, and if abnormal, change the engagement of 0145 with 3413 to make adjustment.



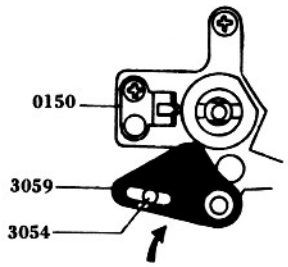
• Confirmation-3: From "S" position, wind up twice, and make sure that the counter graduation indicates "1".
Further wind up and check that there is no skipping, double feeding or stepping.

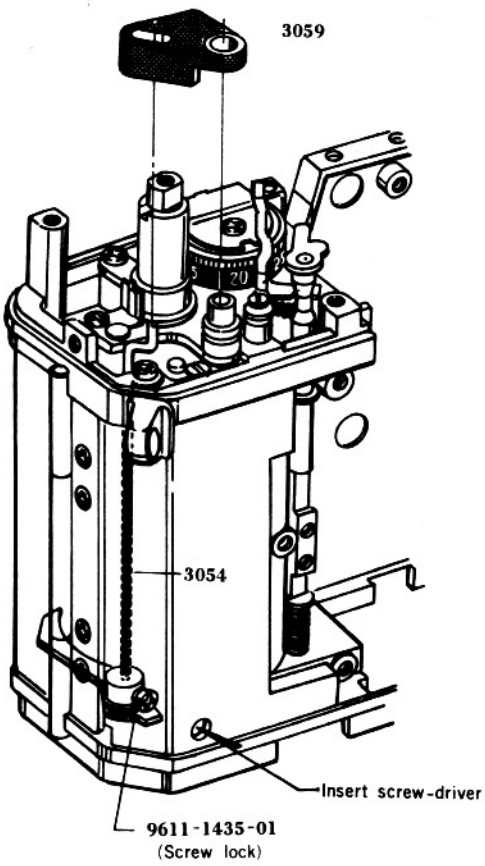
• Confirmation-4: Ensure the position of sprocket. (Refer to P. 4.)

■Positioning of Multiple Exposure Axis

■Proceed accordingly:

①Fix **3059** to the body as shown in the right drawing.
② Loosen **9611-1435-01** and bring **3054** to the same surface level with **3059**.
③ Press **3059** in the arrow direction and while contacting it to **0150**, tighten **9611-1435-01**.



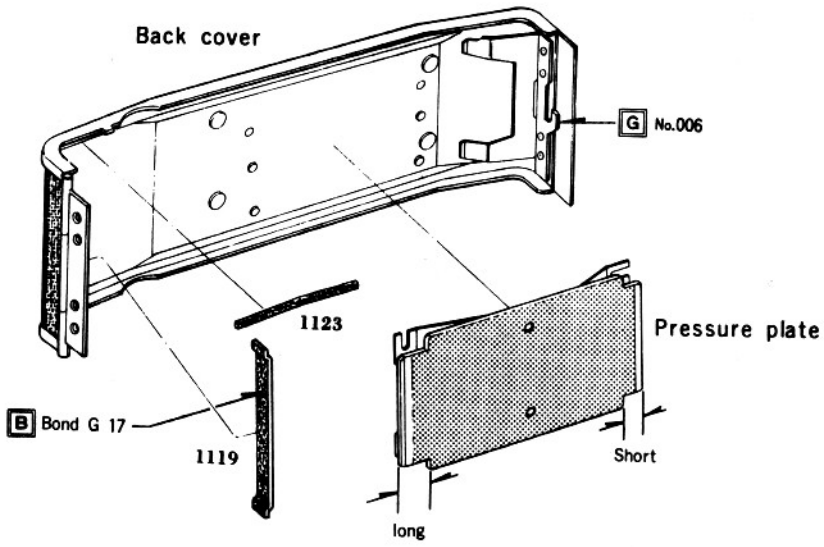


■Checking after adjustment

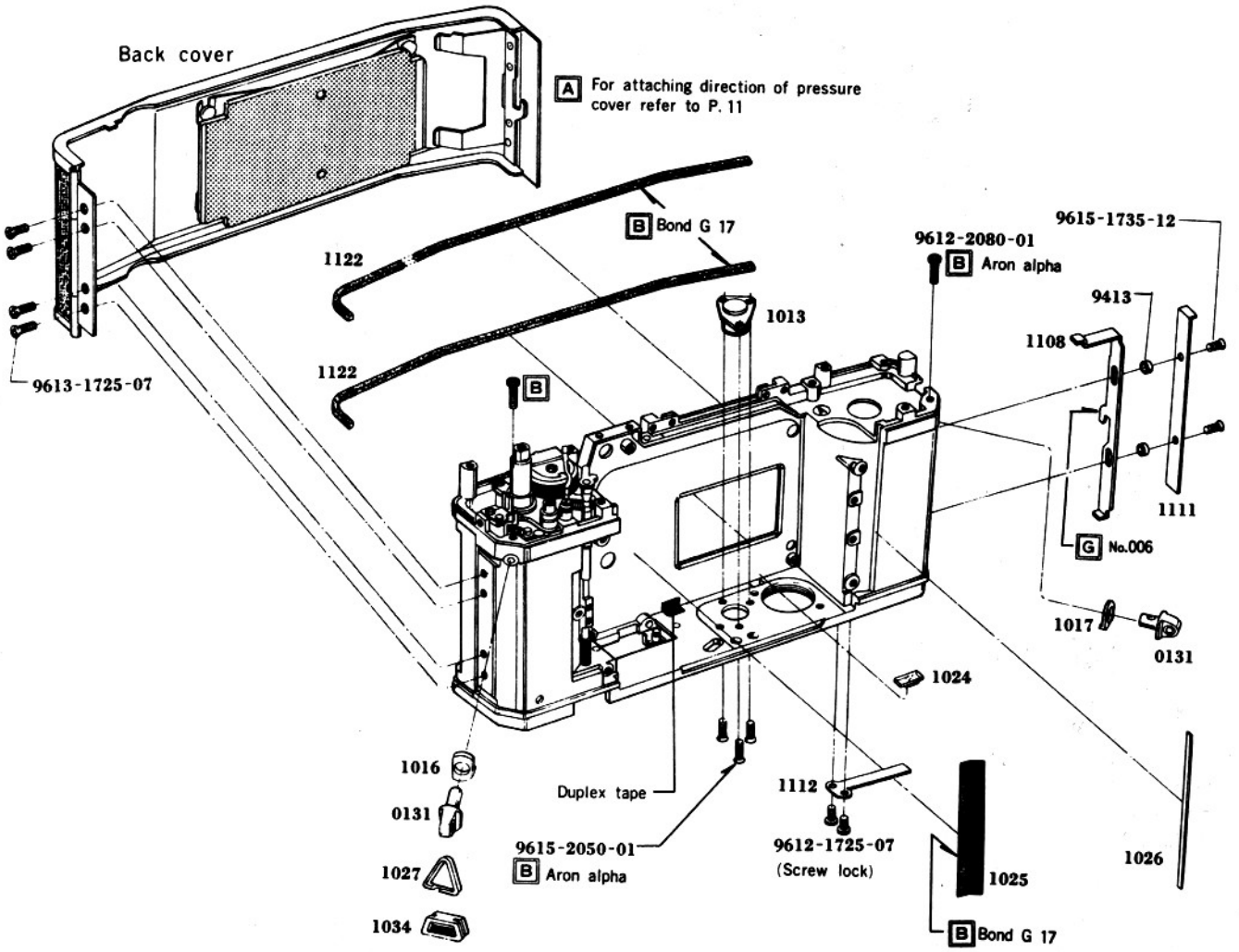
① Fix the multiple exposure lever and film advance lever to the body.
② Normal shooting position of multiple exposure lever: Wind up and make sure that the spool and sprocket work normally.
③ Multiple shooting position of multiple exposure lever: Wind up and make sure that shutter charge is possible with the spool and sprocket inoperative.

■Attaching Direction of Back Cover Pressure Plate

■Refer to the drawings below:

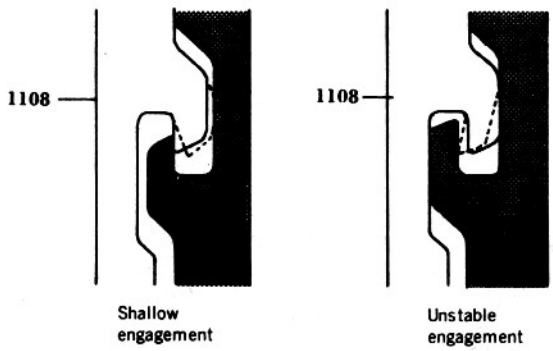


Body 7 Back Cover



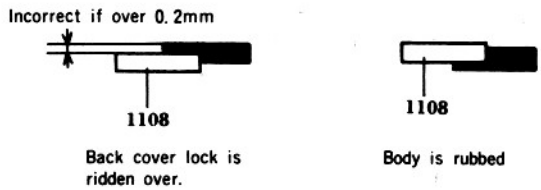
■Lock Adjustment of Back Cover

If the engagement is shallow or unstable, adjust as follows:



• Bend 1108 to make adjustment.

If the back cover lock is ridden over or the body is rubbed, adjust as follows:



• Make adjustment by bending or extending the overall length of back cover

Body 8 Shutter Block and Contact Holder Set

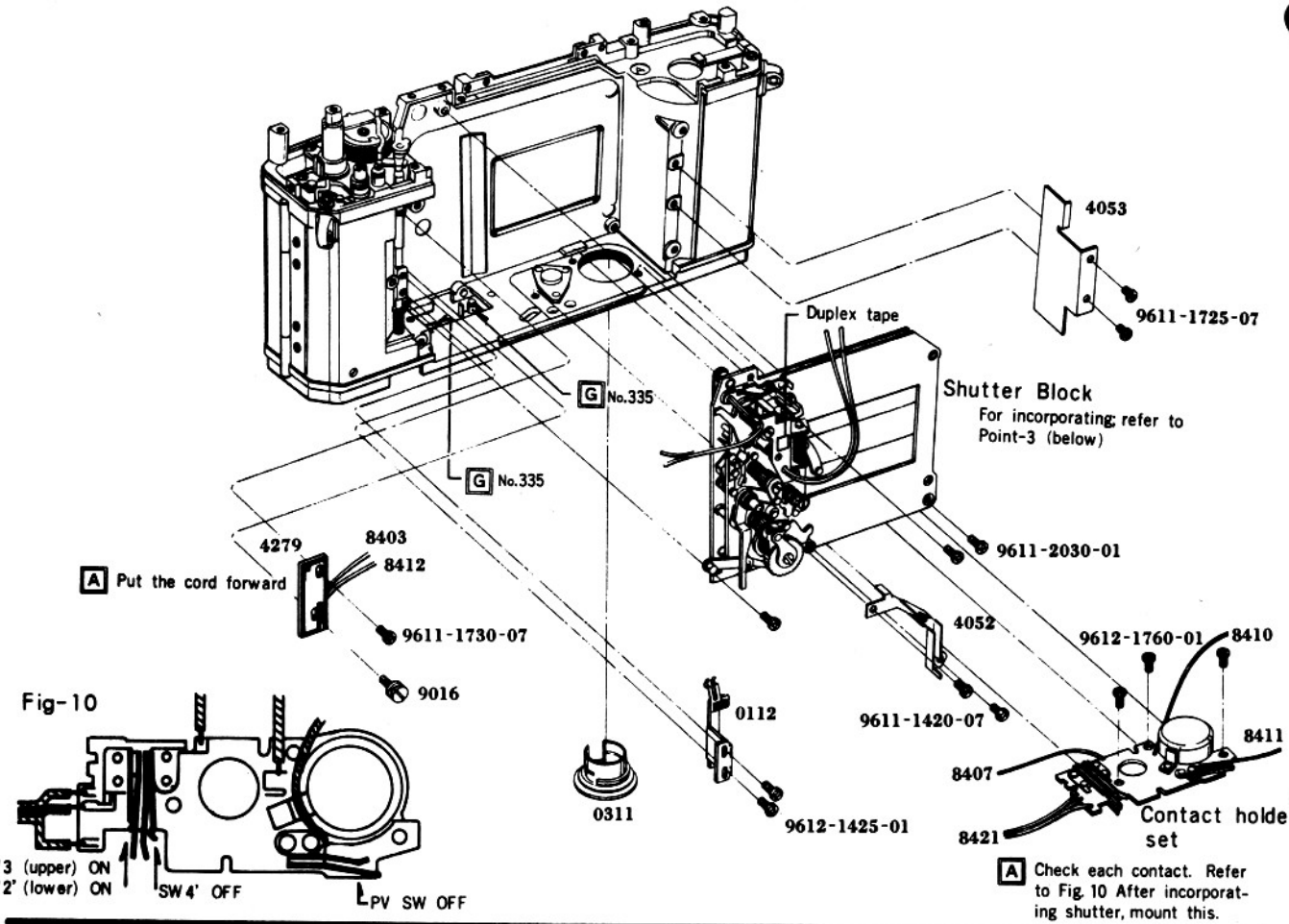
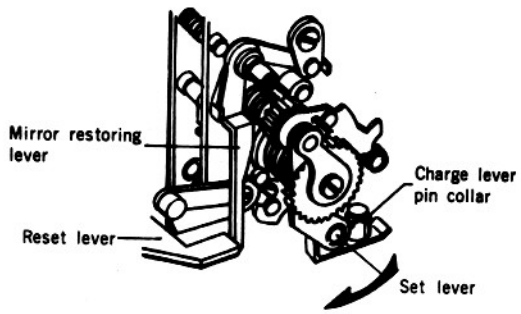


Fig-10

POINT-3 Incorporating of Shutter Block

■Proceed as follows:

① Complete wind up procedure.
② Turn the shutter set lever in the arrow direction and charge the shutter.
③ Incorporate the shutter block so that the shutter set lever will be in the charge lever pin collar of the body and that the mirror restoring lever will be on the side of the reset lever.

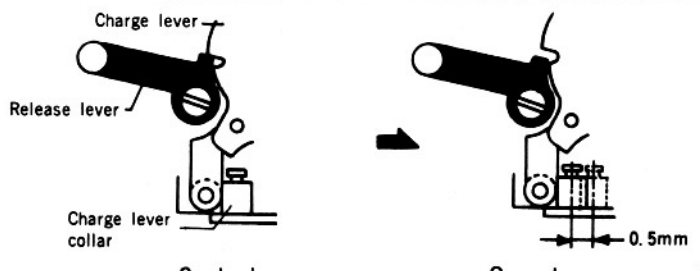


■After incorporating, perform the following checkup and adjustment in order:

① Check shutter block performances. (Refer to P. 48)
② Adjust overcharge amount. (Refer to the following)
③ Adjust shutter release position and OFF of SW. 2' (Refer to next page 37)

■Overcharge Amount

Wind up gently and make sure that there is an overcharge amount exceeding 0.5mm after the release lever has engaged with the charge lever; and if not, replace the charge lever collar (9432: 4φ, 9434: 3φ, 9435: 3.5φ, 9437: 2.5φ) for adjustment.



Cocked

Overcharge amount

■Adjustment of Shutter Release Position and OFF of SW. 2′

■Proceed as follows:

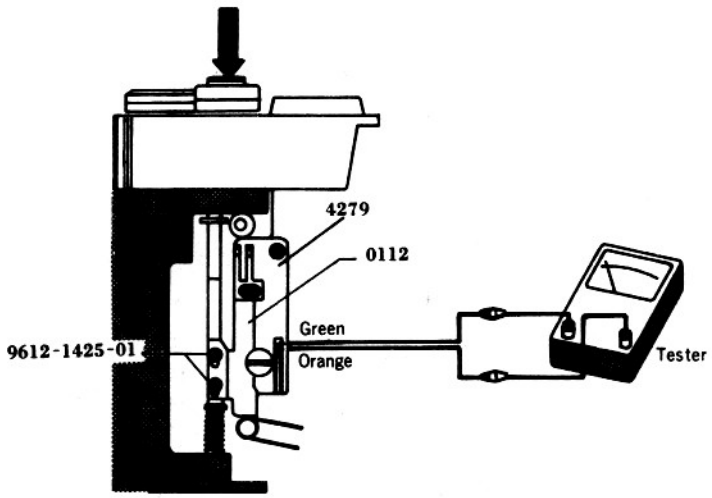
① Temporarily set the top cover and film advance lever to the body.

② Shutter release position

- Loosen 9612-1425-01 (two) so that the shutter can be released at the position where the shutter button is lowered by 1.5mm and make adjustment of 0112.

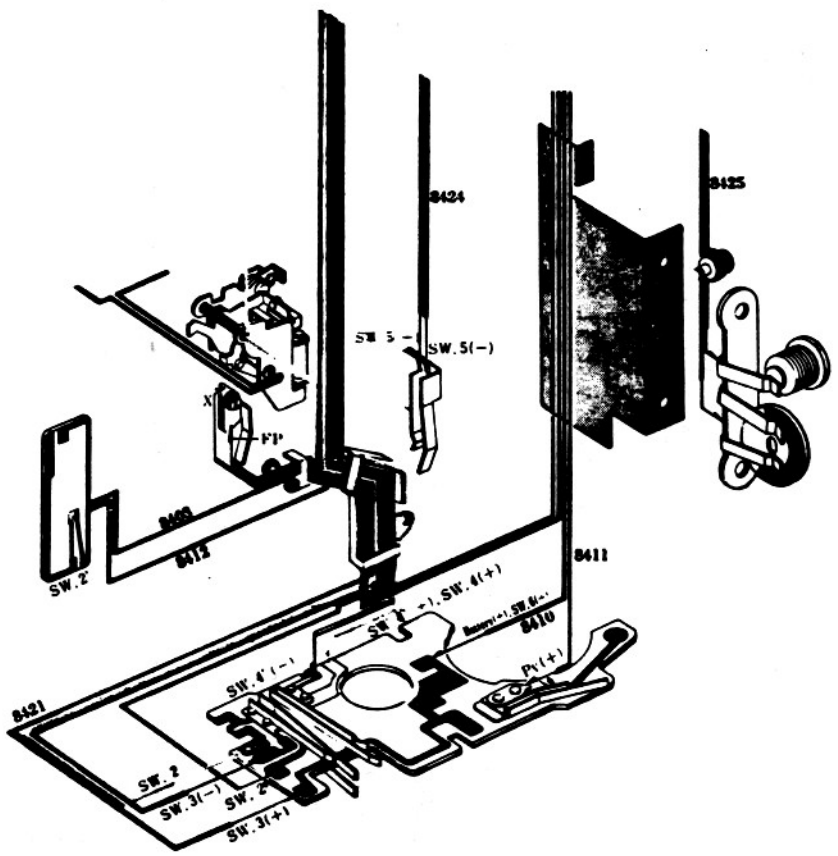
③ Make adjustment

- Make adjustment so that it can be turned OFF 0.3mm ahead of the position in which the shutter is released.



■After adjustment, carry out soldering of lead wires.
(Refer to the following ☟)

■Arrangement and Soldering of Lead Wires



Body 9 Shutter Base Plate, Printed Base Plate-B, SS Dial Pulley, Rewinding Base Plate and Eye-piece Frame

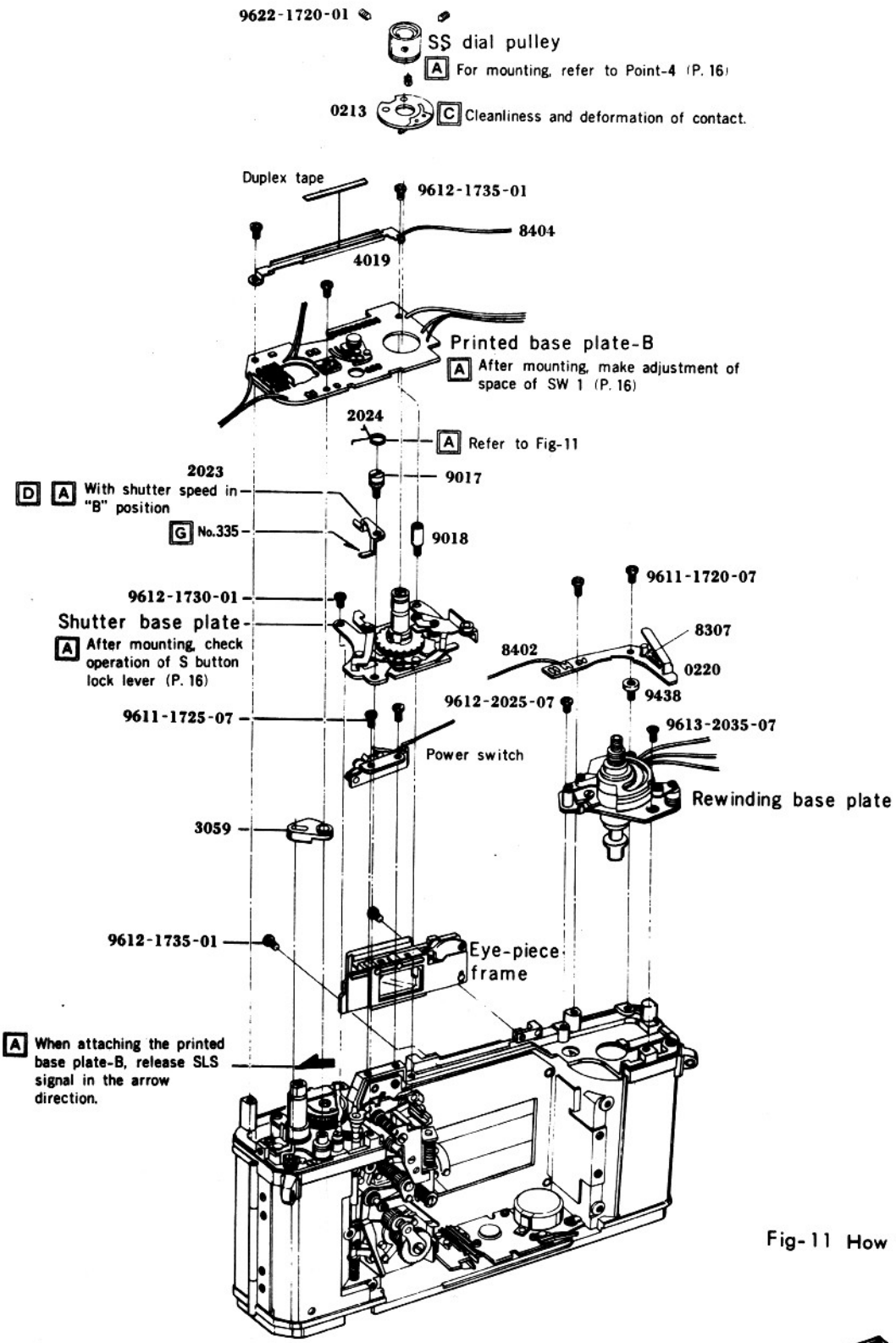
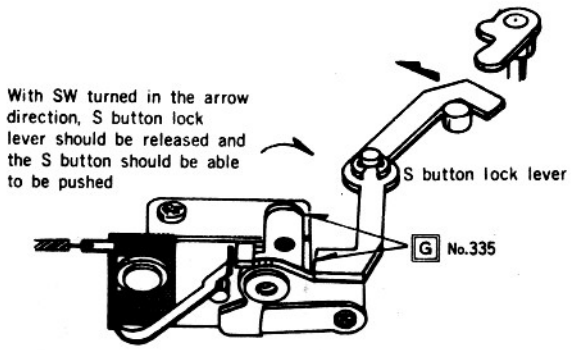


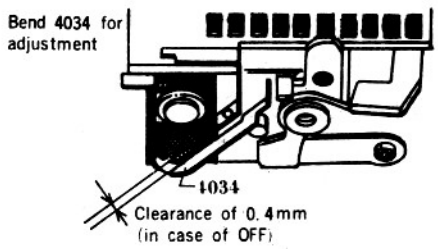
Fig-11 How to engage 2024 SP.

■S Button Lock Lever Operation Check


With SW turned in the arrow direction, S button lock lever should be released and the S button should be able to be pushed
S button lock lever
G No.335

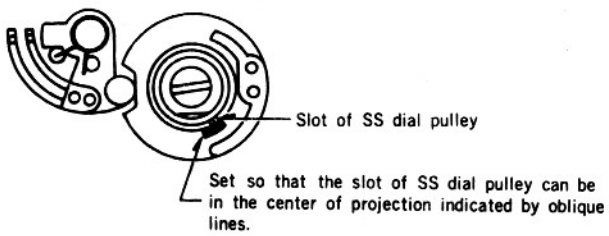
■Spacing Adjustment of SW. 1

※In case of ON, contact pressure should exist.



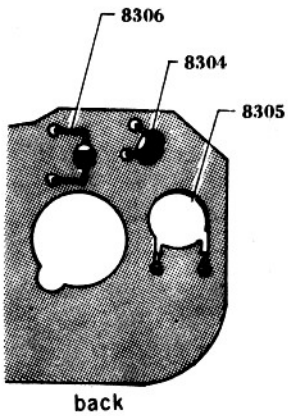
POINT-4 Installation of S. S. Dial Pulley

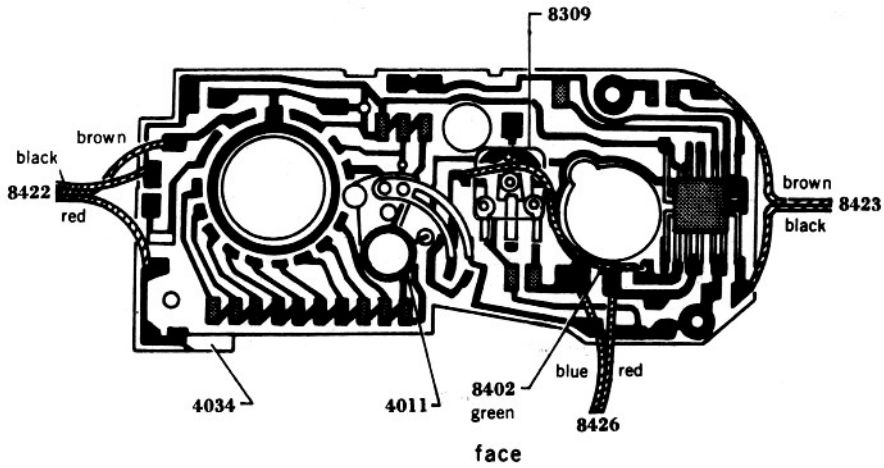
■With shutter speed of AUTO, the brush holder (0213) is in the position shown below.



■Print Base Plate-B

■For mounting each part, refer to the drawing below.





Shutter Base Plate

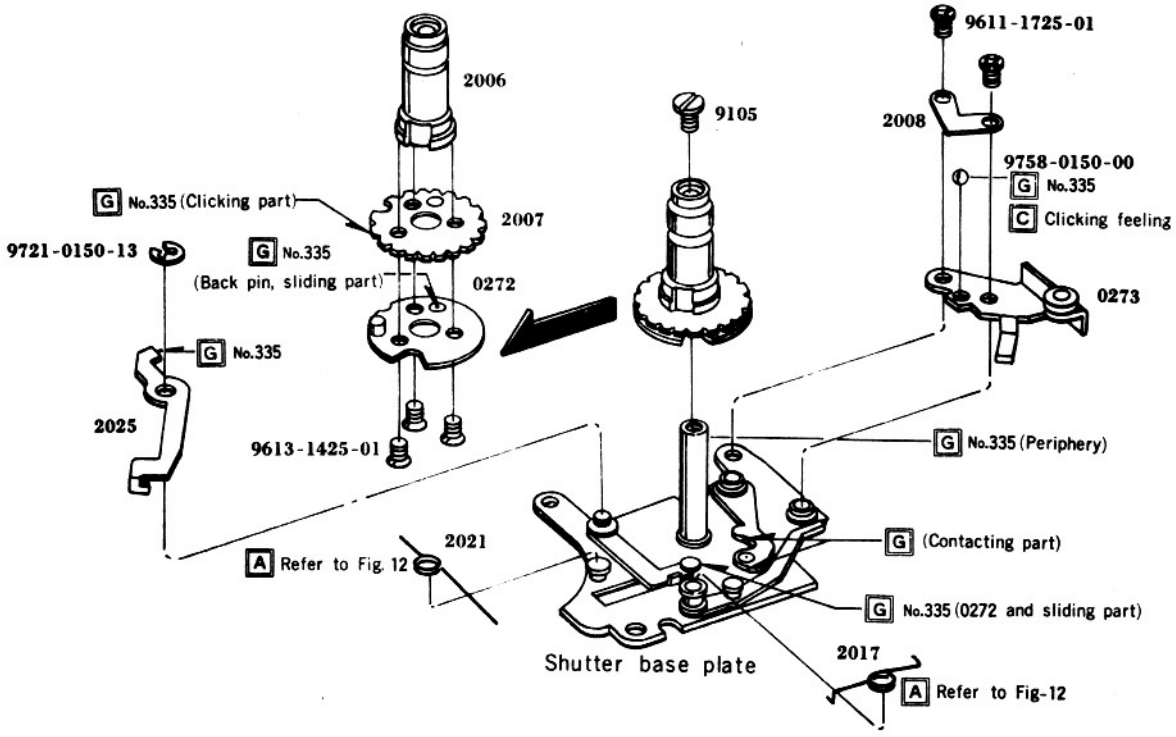
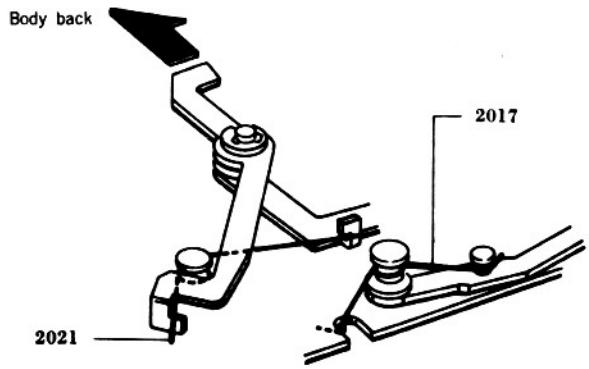
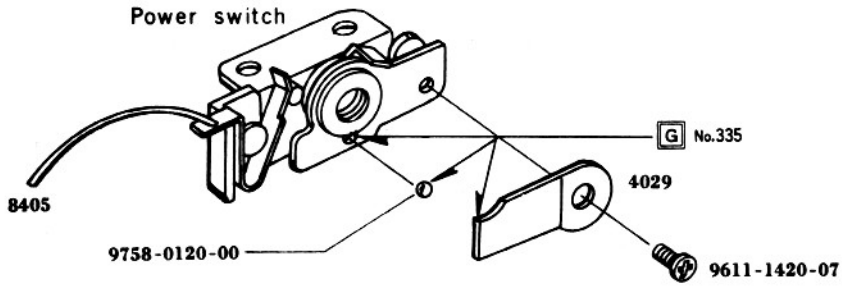


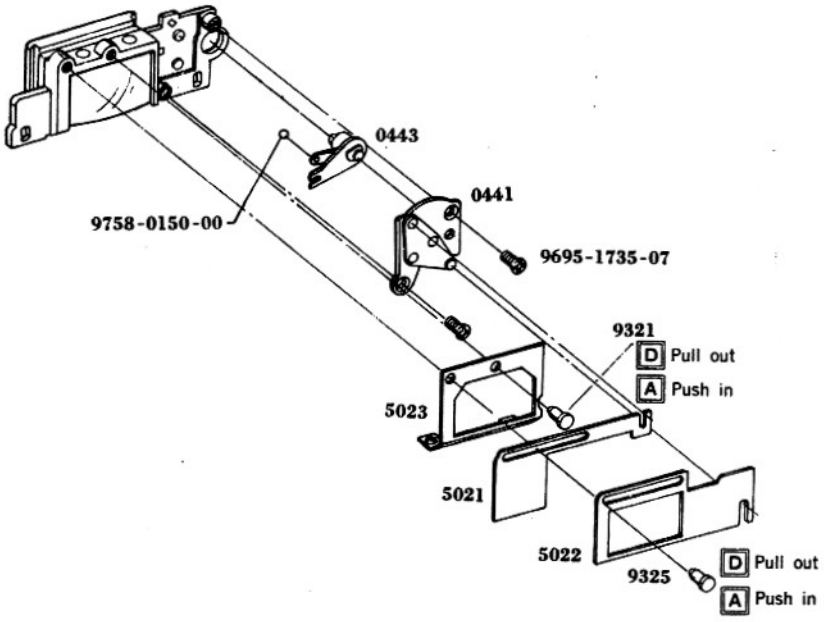
Fig-12 How to engage 2021, 2017 SP



Power Switch

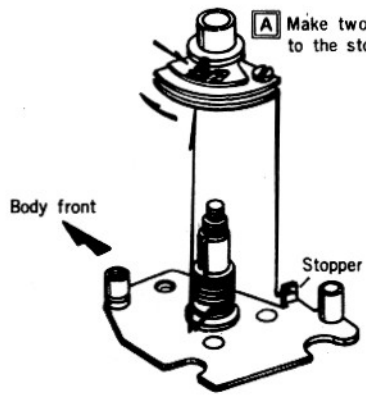


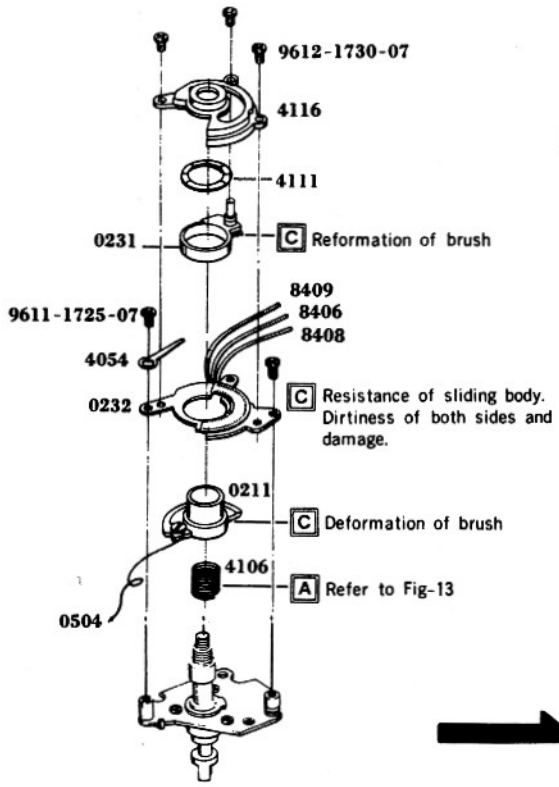
■Eye-Piece Frame

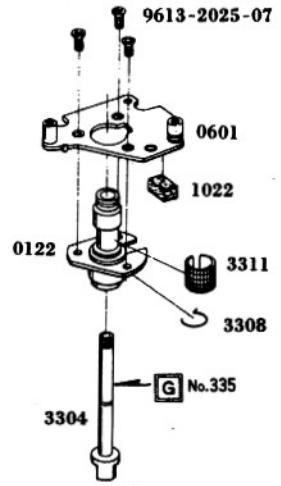


■Rewinding Base Plate

Fig-13 How to engage 4106 SP







Mirror Box-1

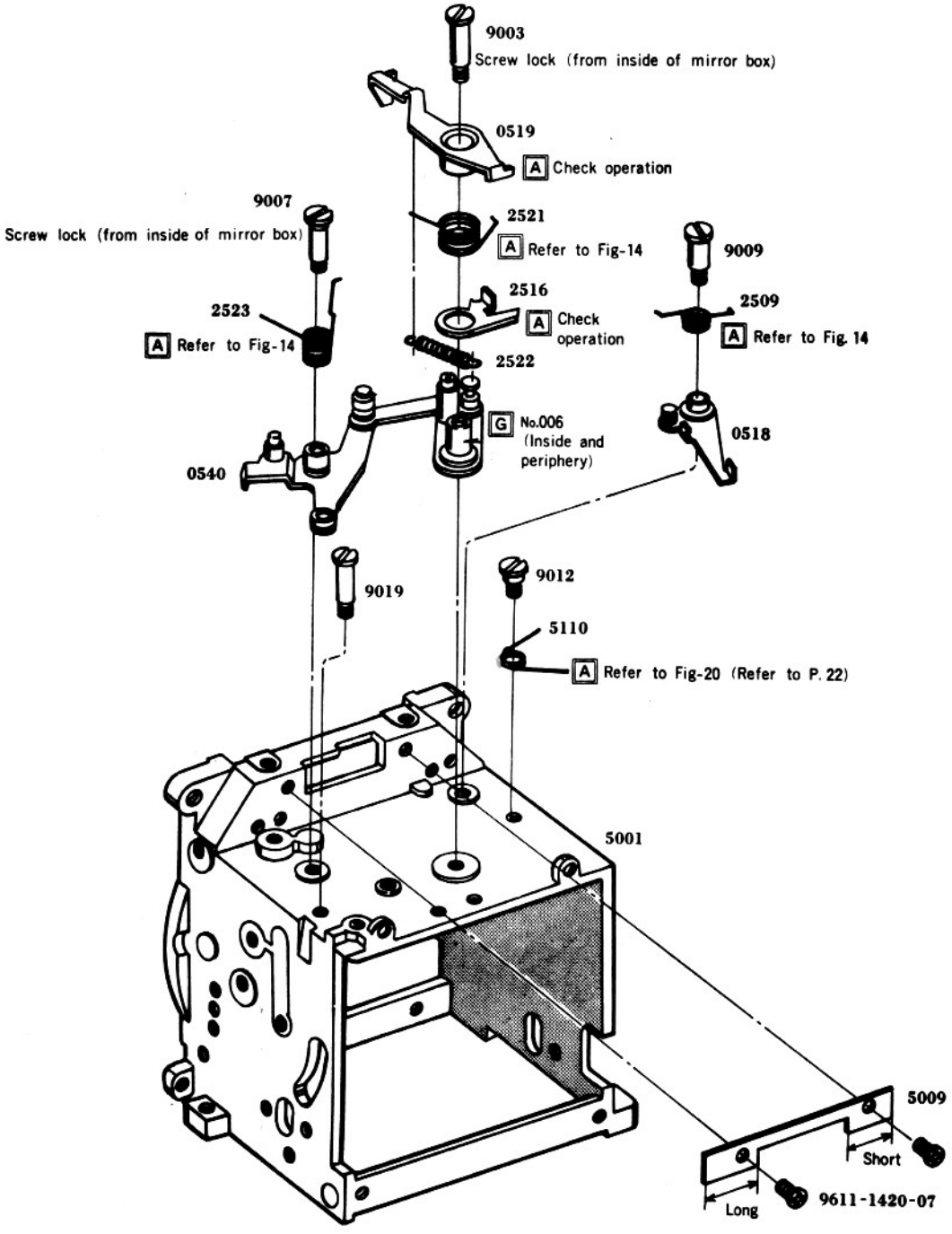
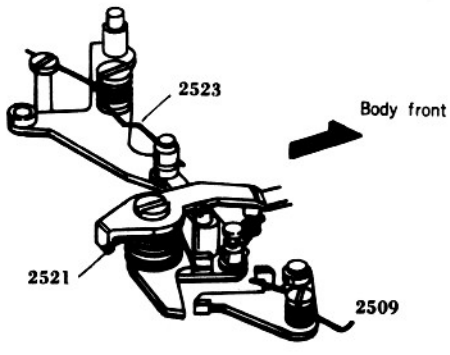


Fig-14 How to engage 2509, 2521, 2523 SP



Mirror Box-2

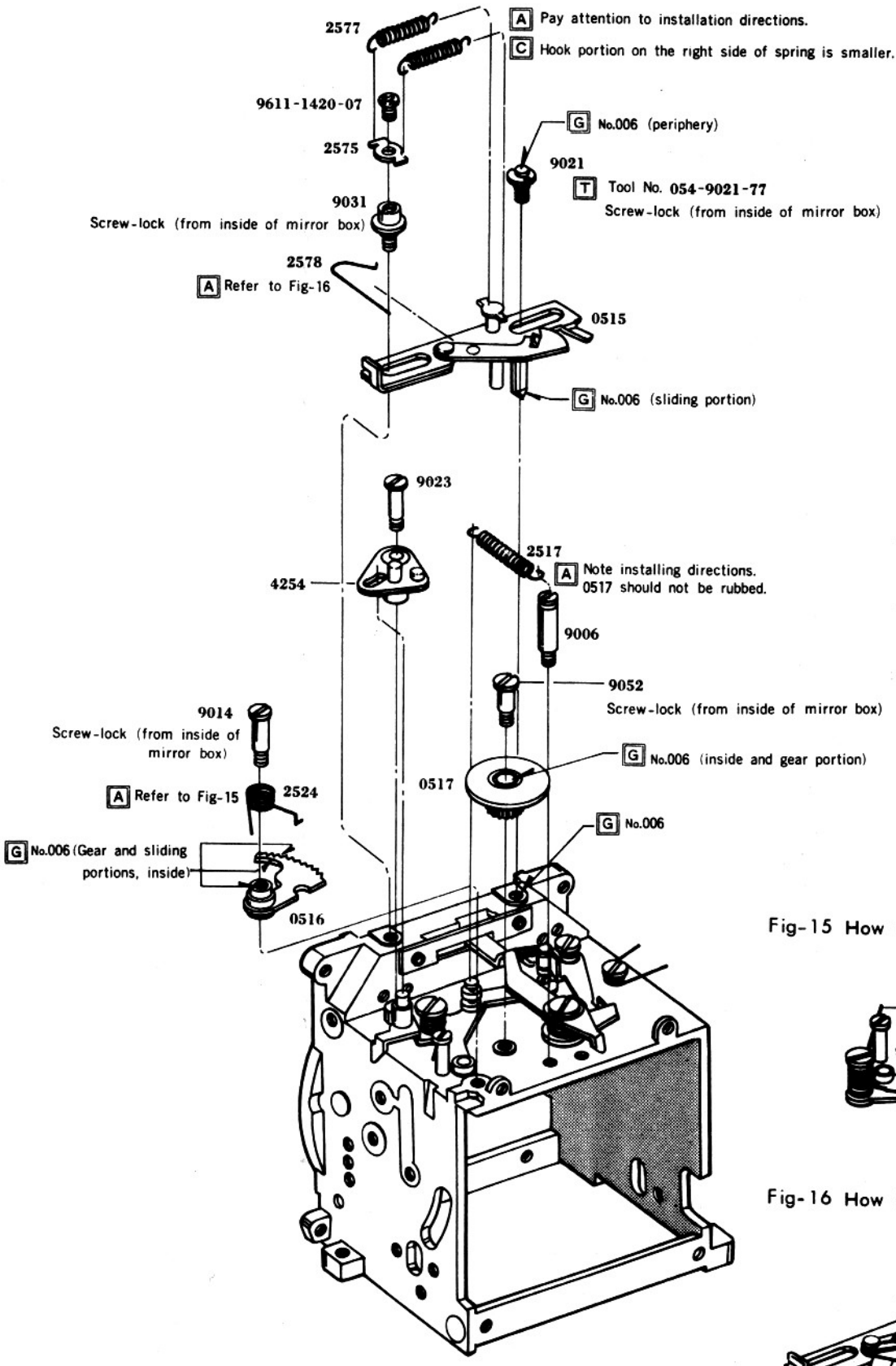


Fig-15 How to engage 2524 SP

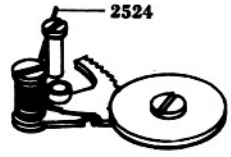
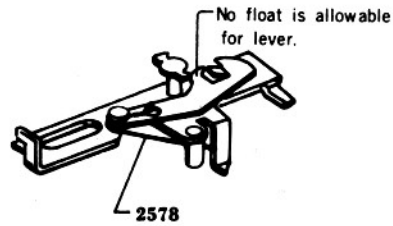


Fig-16 How to engage 2578 SP



Mirror Box-3

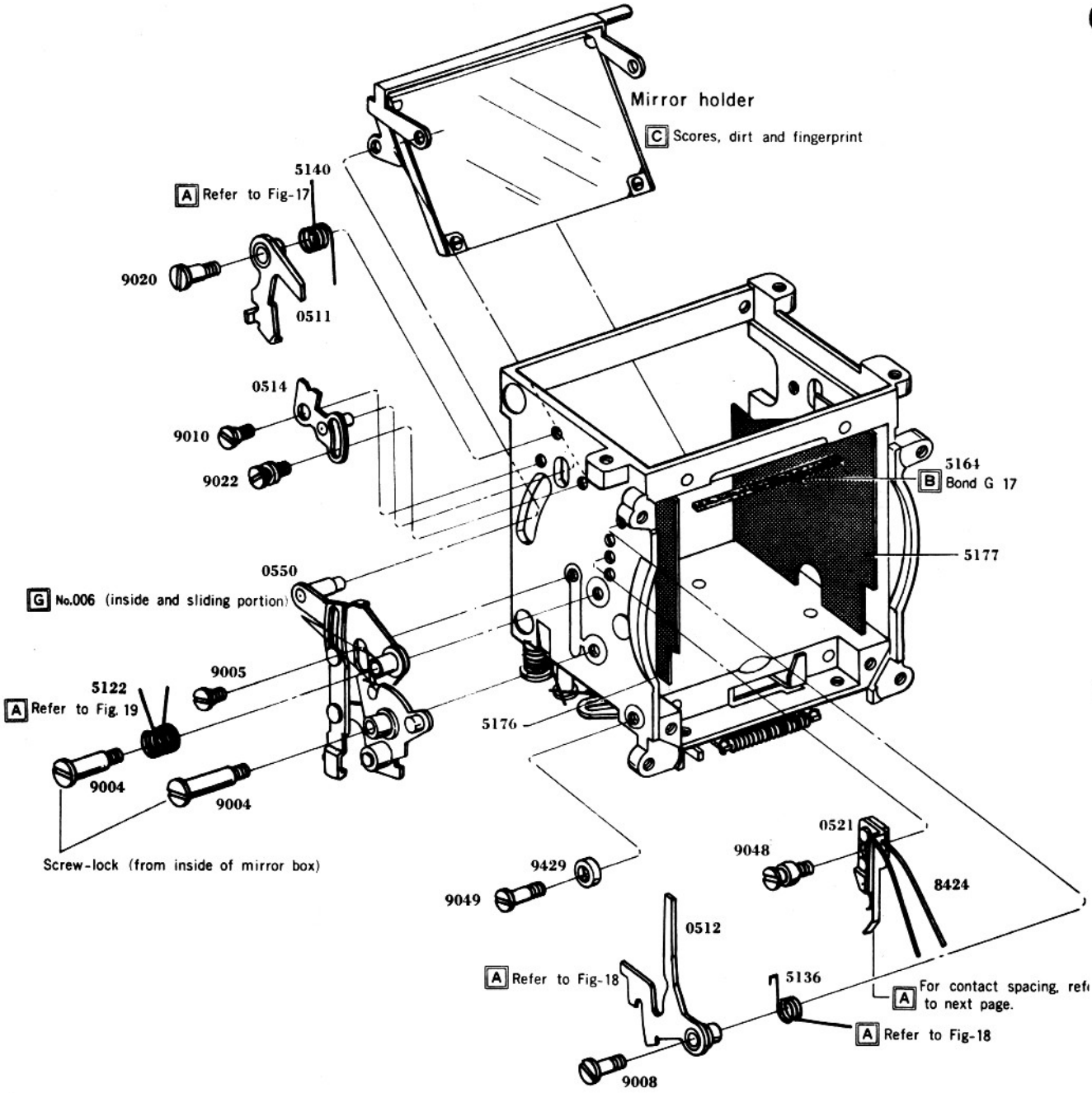


Fig-17 How to engage 5140 SP

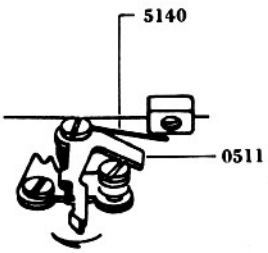


Fig-18 How to engage 5136 SP

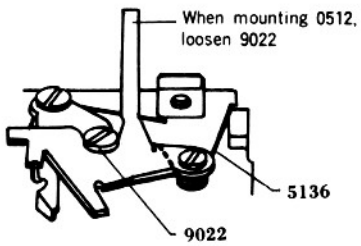
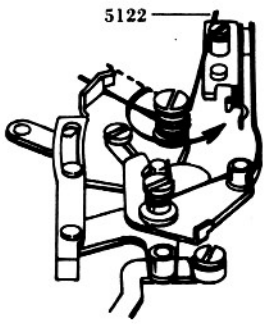
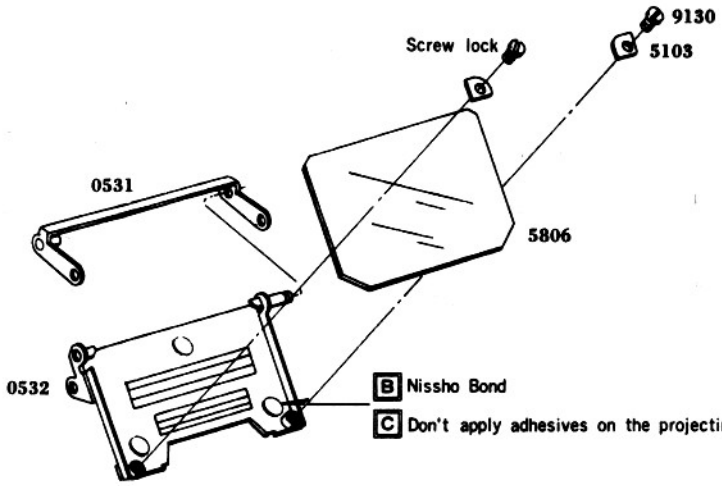


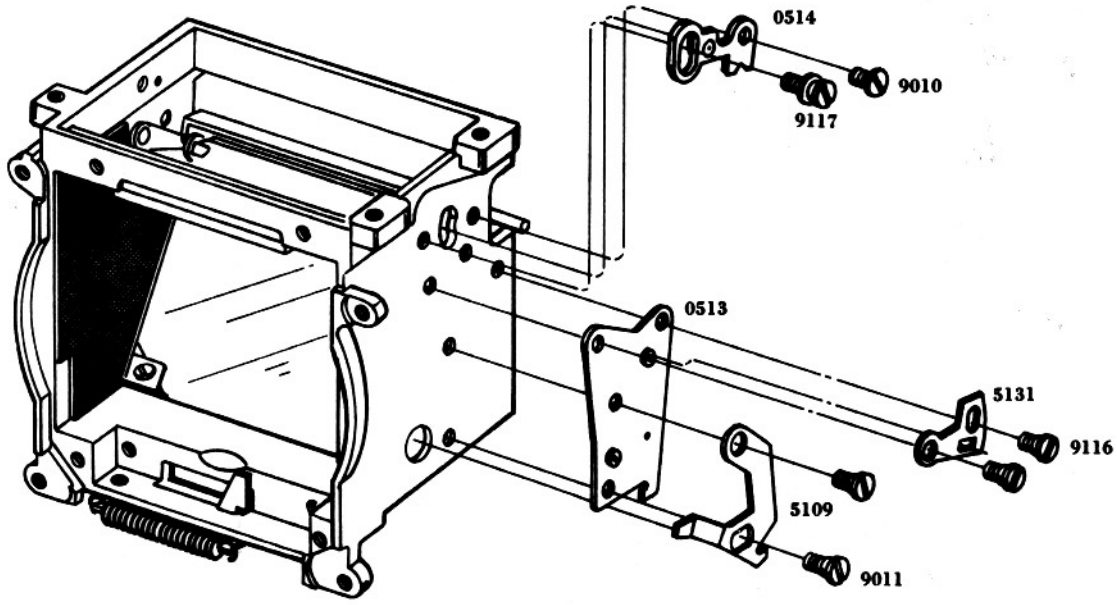
Fig-19 How to engage 5122 SP



■Mirror Holder

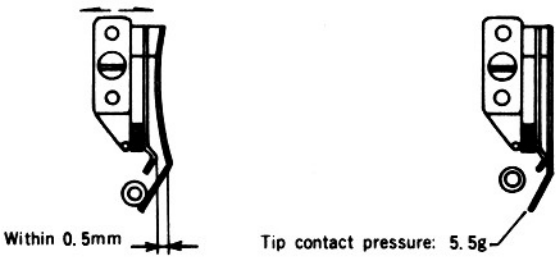


Mirror Box-4



■After incorporating this, make spacing adjustment of SW. 5.

■Space Adjust of SW. 5



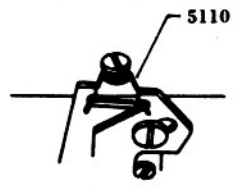
■Mirror lowered.

Make adjustment by loosening 9408 and moving SW. 5. horizontally.

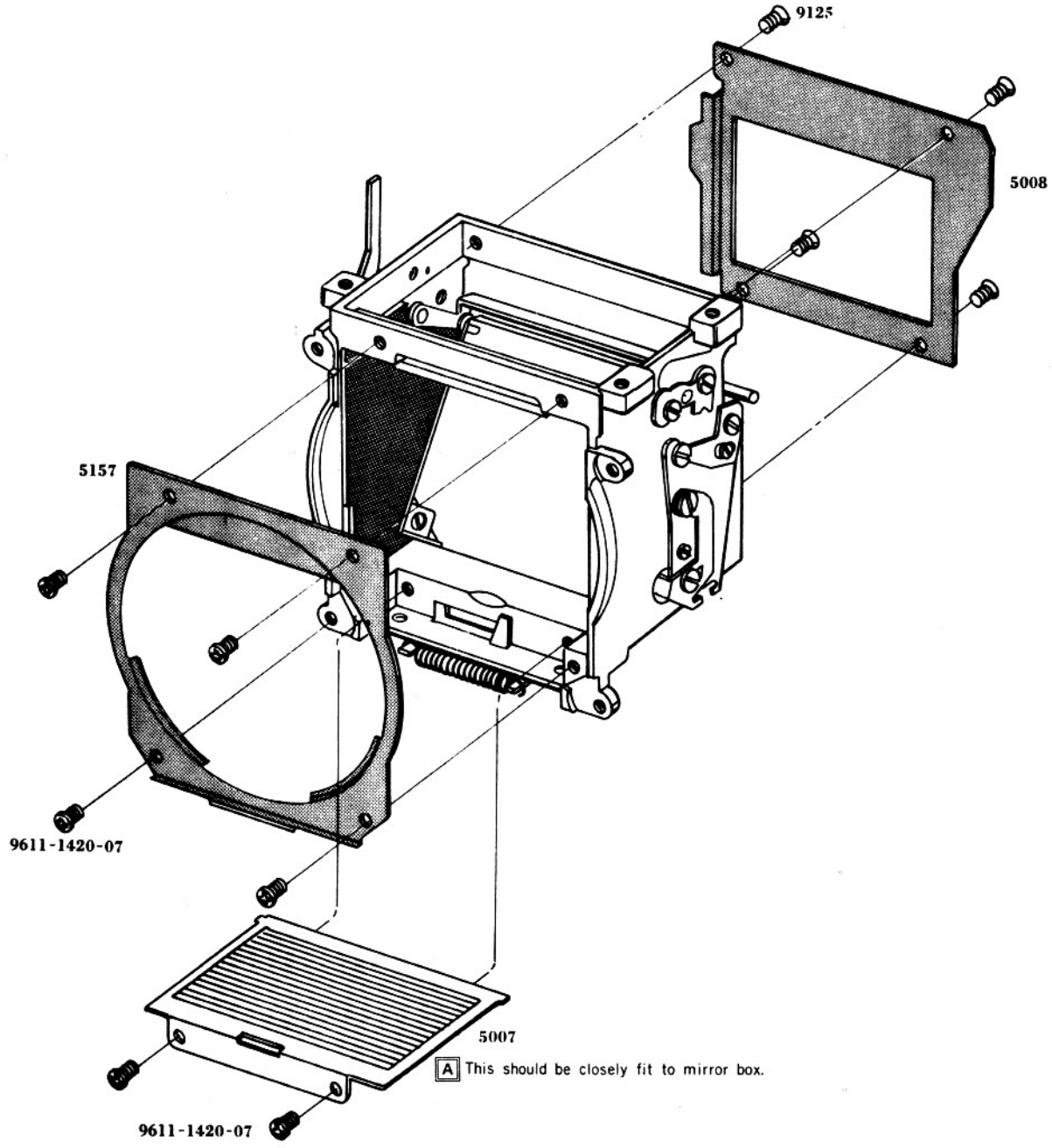
■Mirror raised.

Make sure that contact is positive.

Fig-20 How to engage 5110 SP.



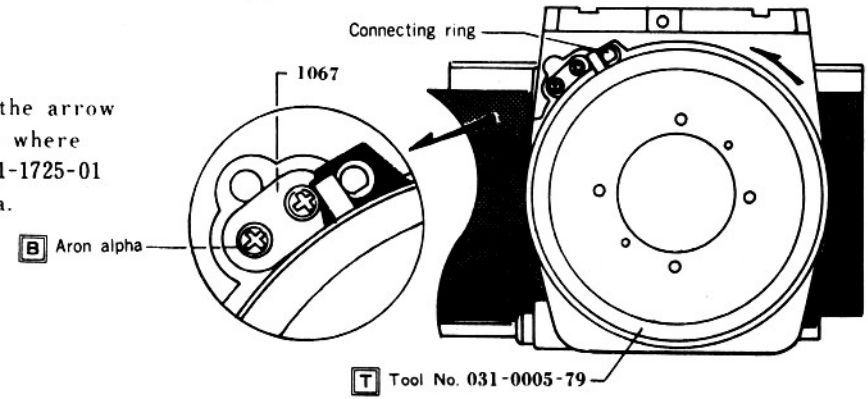
Mirror Box-5



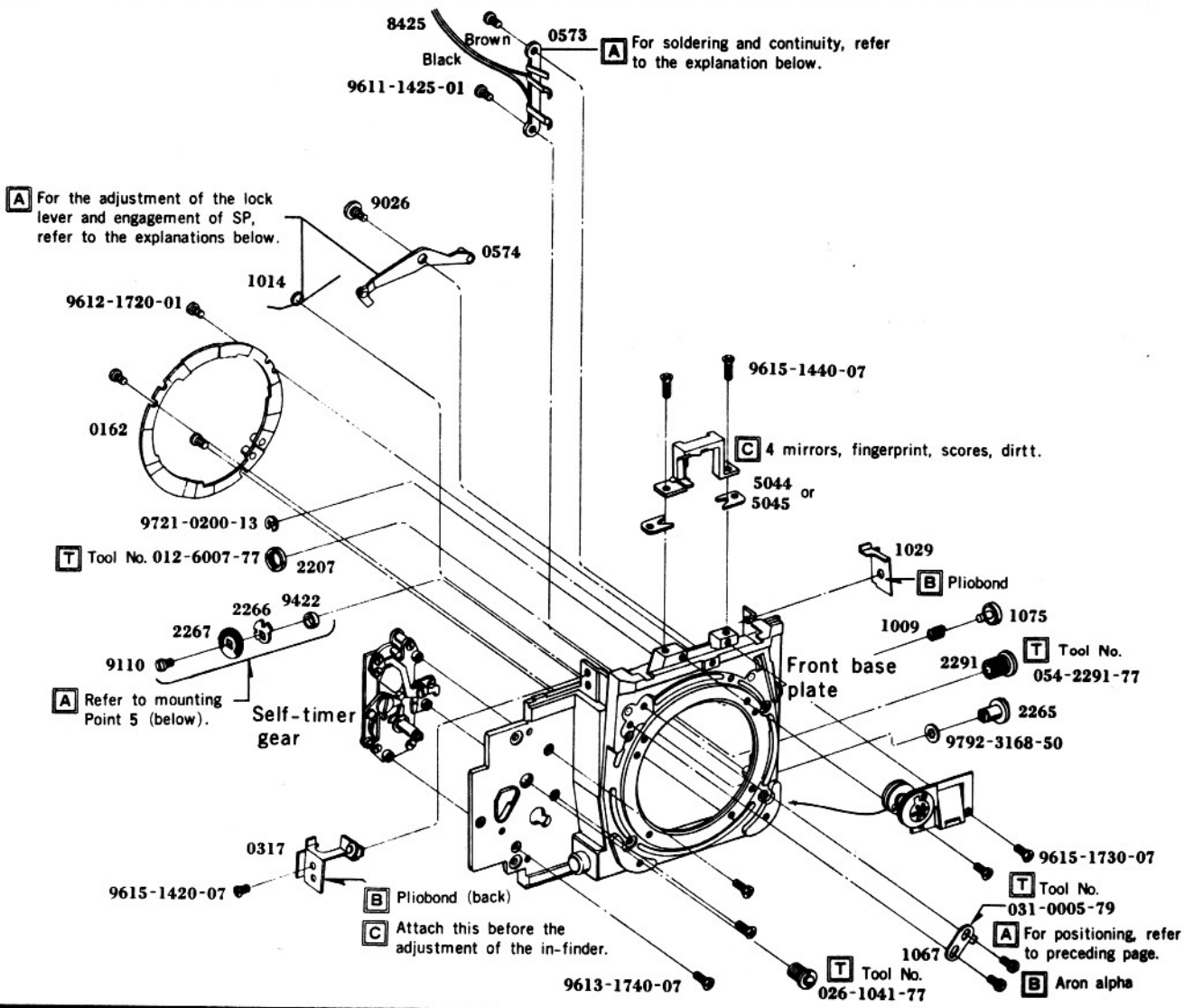
■Positioning of Connecting Ring Stopper (1067)

■Using special tool (Tool No. 031-0005-76), proceed as follows:

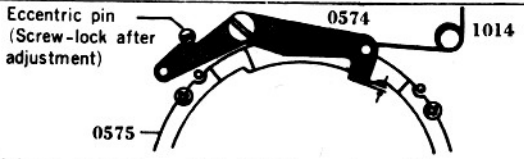
Move the connecting ring in the arrow direction, and at the position where 1067 is contacted tighten 9611-1725-01 and attach it with aron alpha.



■Front Base Plate



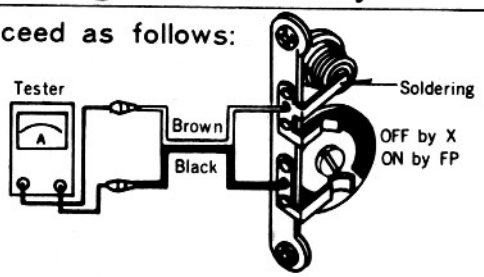
■Adjust of Lock Lever and How to Engage 1014SP



■After engaging SP (1014), make adjustment by means of eccentric pin, as shown above, so that the tip of 0574 may be within 0~0.2mm against 0575.

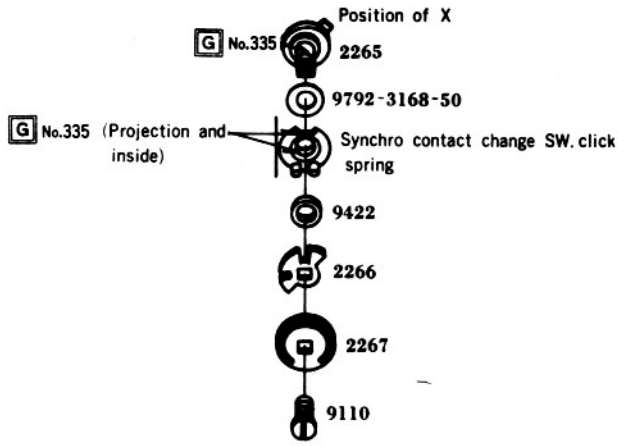
■Checking of Synchro Contact Soldering and Contnuity

■Proceed as follows:



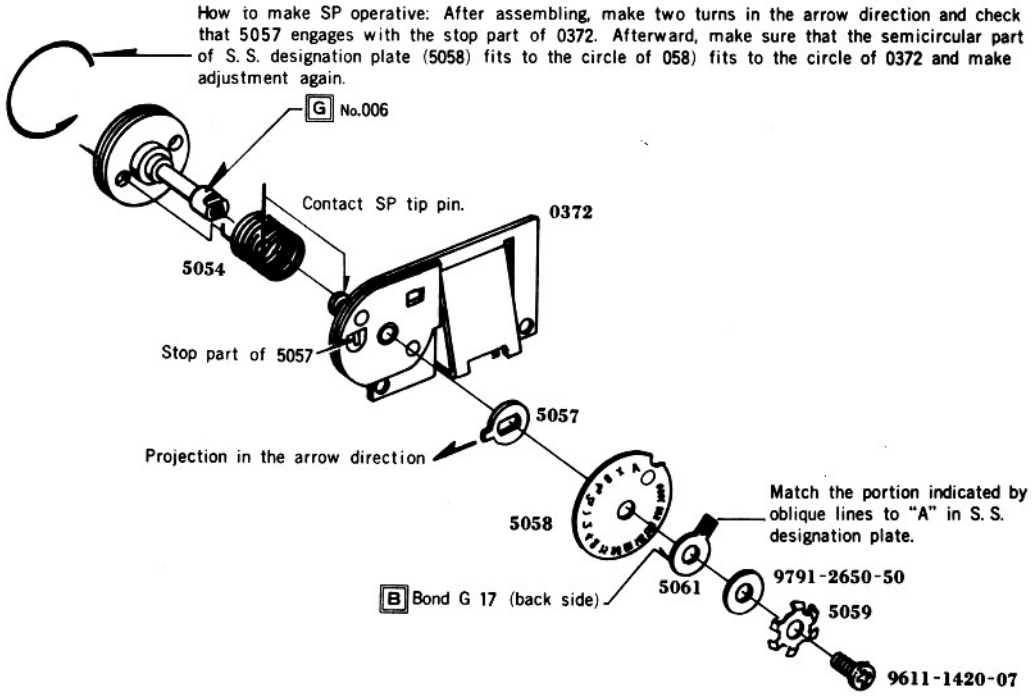
■POINT-5 Synchro Change SW. Installation

■Proceed according to the drawing below:

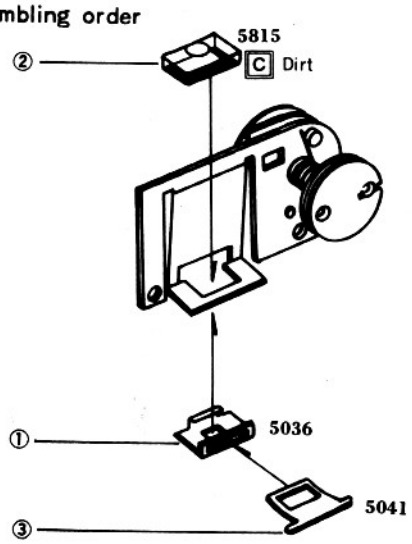


■After assembling, check the click feeling.

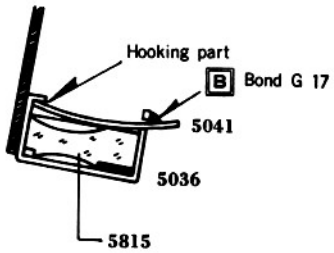
■S. S. Designation Plate


How to make SP operative: After assembling, make two turns in the arrow direction and check that 5057 engages with the stop part of 0372. Afterward, make sure that the semicircular part of S. S. designation plate (5058) fits to the circle of 058) fits to the circle of 0372 and make adjustment again.
G No.006
Contact SP tip pin.
0372
5054
Stop part of 5057
5057
Projection in the arrow direction
5058
Match the portion indicated by oblique lines to "A" in S. S. designation plate.
B Bond G 17 (back side)
5061
9791-2650-50
5059
9611-1420-07

■Assembling order

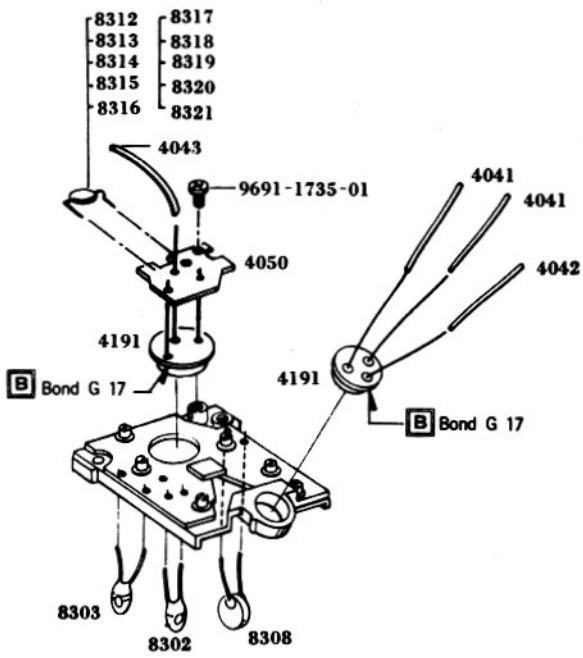


■Cross section of diaphragm-in-finder lens (5815) being attached.



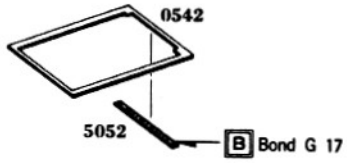
■Penta Holder

■Printed base plate A set

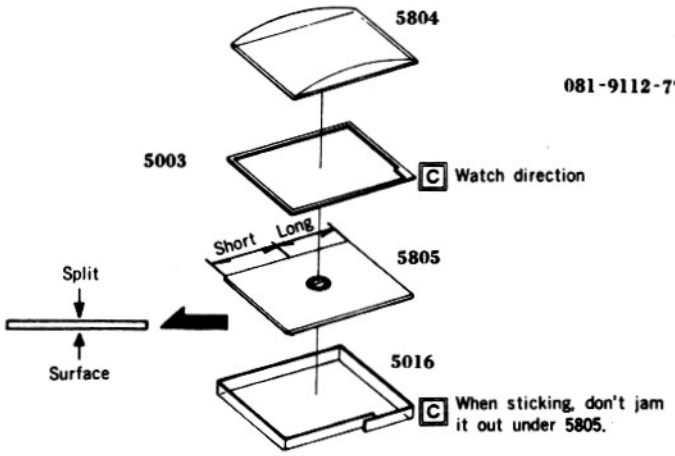


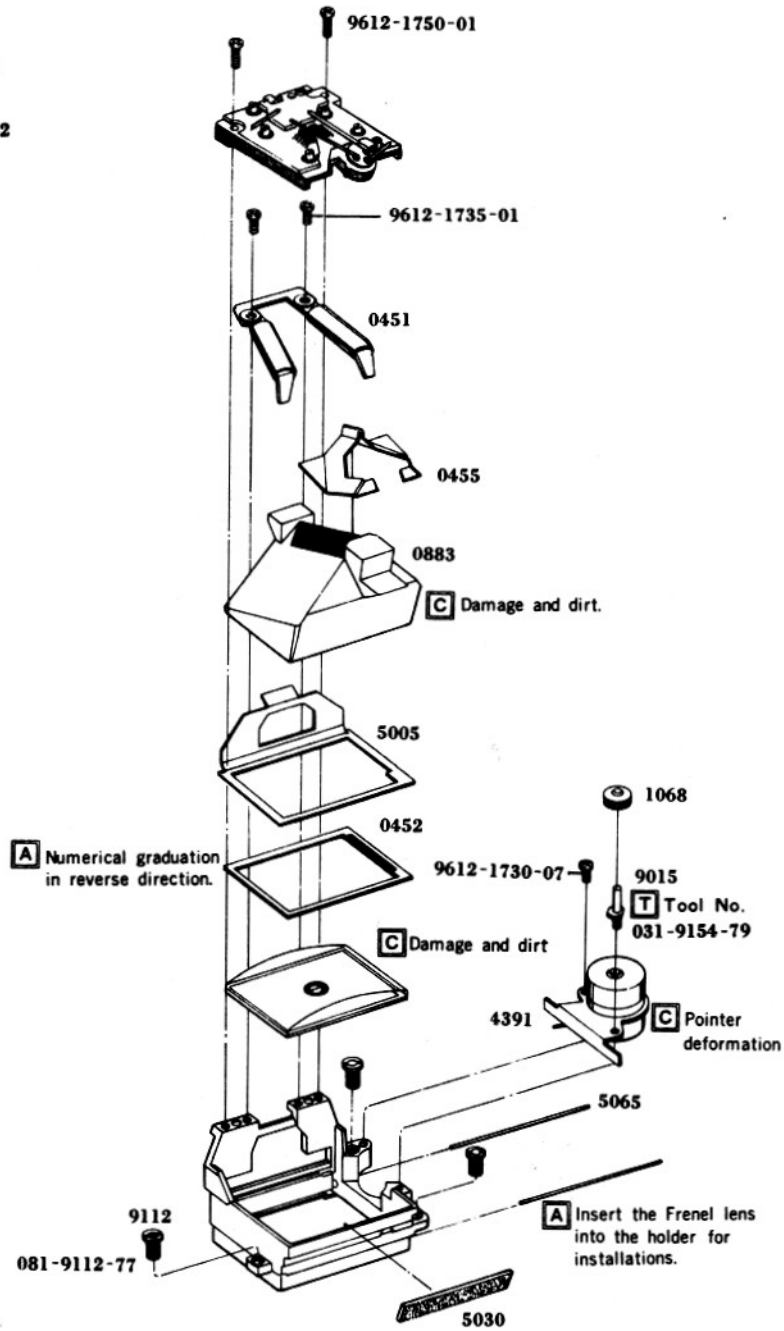
■Penta pressure plate set

■Penta frame set

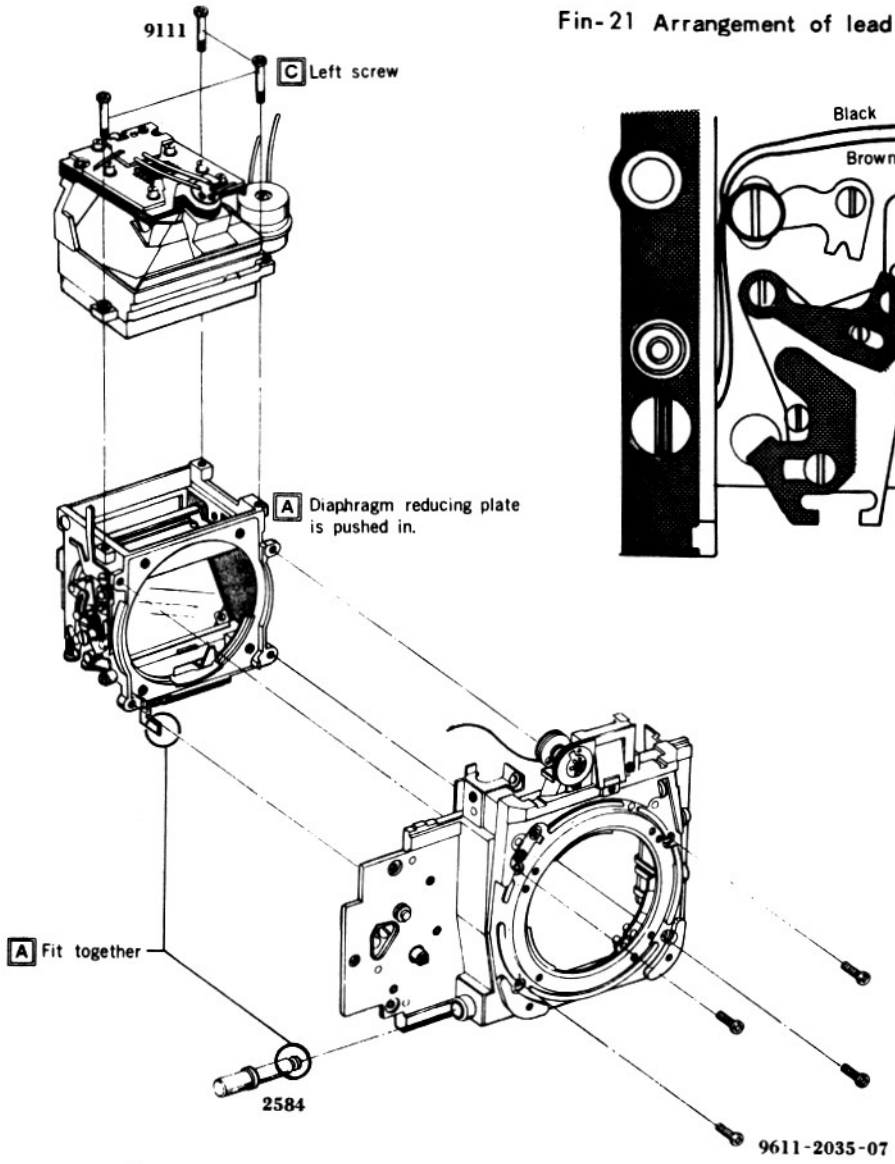


■Fresnel lens set

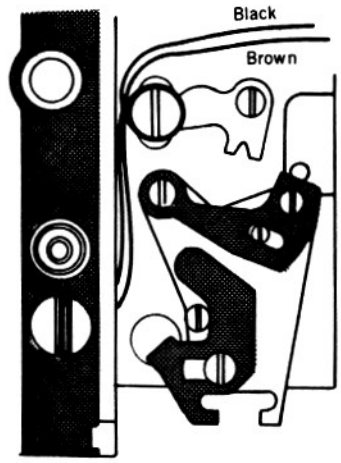




■Front Base Plate Set (Front Base Plate, Mirror Box and Penta Holder)



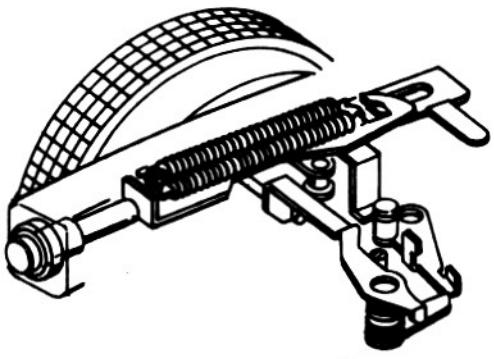
Fin-21 Arrangement of lead wires



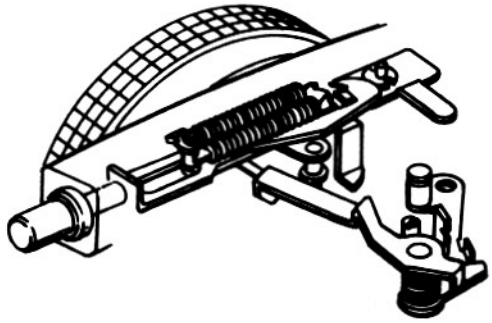
■After assembling ① Arrange lead wires. (Refer to Fig-21)
② Check diaphragm reducing operation. (Refer to below)
③ Adjust mirror angle. (Refer to next page ☞).

■Confirmation of Diaphragm Reducing Operation

Opening time: attach the standard lens and check that the opening is possible with F 16 aperture.



Diaphragm reducing time: attach the standard lens and make sure that the minimum aperture is possible with F 16.



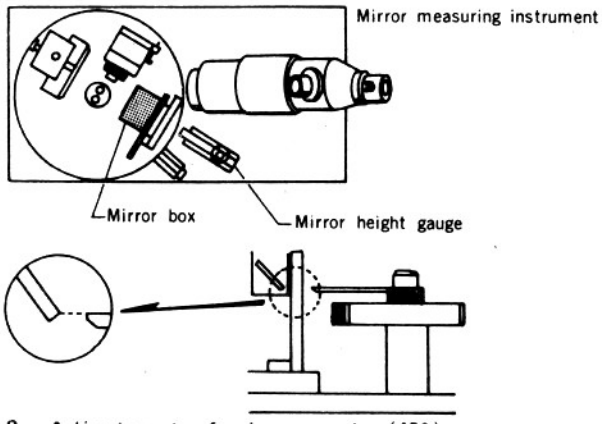
■Mirror Angle

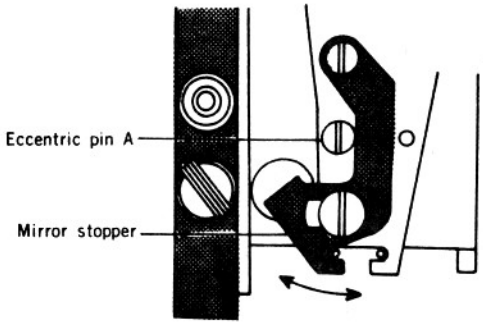
■**Measuring device:** Mirror angle measuring instrument (Model MA-Ⅱ) remodeled.

■**Rated value:** 45° ±20′

■Adjustment of Front-and-Rear Position (Height) of Mirror.

1. Set to the measuring instrument the set of mirror box and front base plate, make it face against the mirror height gauge and adjust the gauge tip by operating themirror stopper (5109) along the arrow direction by means of the eccentric pin A so that the gauge tip may coincide when viewed.

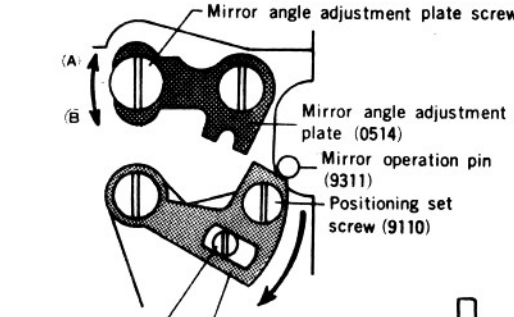


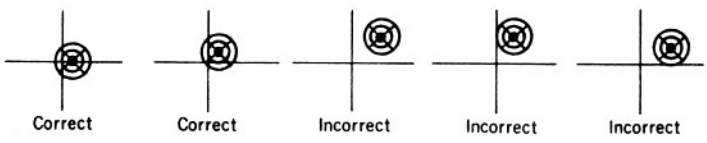


2. **Adjustment of mirror angle (45°)**

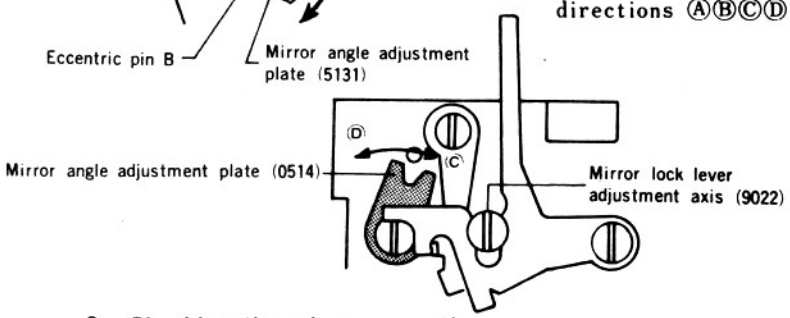
a) With the mirror box correctly facing against the autocollimator, release along the arrow direction the mirror angle adjuster plate (5131) by means of the eccentrio pin B, look into the autocollimator, loosen the mirror angle adjustment plate sorews (9022 and 9117) both on the mirror box so that the center of chart image may be on the cross hairs, make adjustment by operating the mirror angle adjustment plate (0514) along the arrow direction, and tighten the mirror angle adjustment plate screws (9022 and 9117).

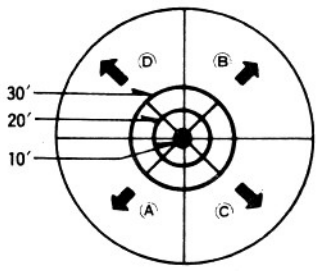
b) After the adjustment of mirror angle, while looking into the auto-collimator to check that the chart image does not change away from on the cross hairs, make adjustment by means of the eccentric pin B so that the mirror angle adjuster plate (5131) is along the counter-arrow direction contact 9311, and then tighten the positioning plate set screw (9116).





As the mirror angle adjustment plate (0514) is moved along directions of ⒶⒷⒸⒹ, the chart image will move along directions ⒶⒷⒸⒹ respectively.





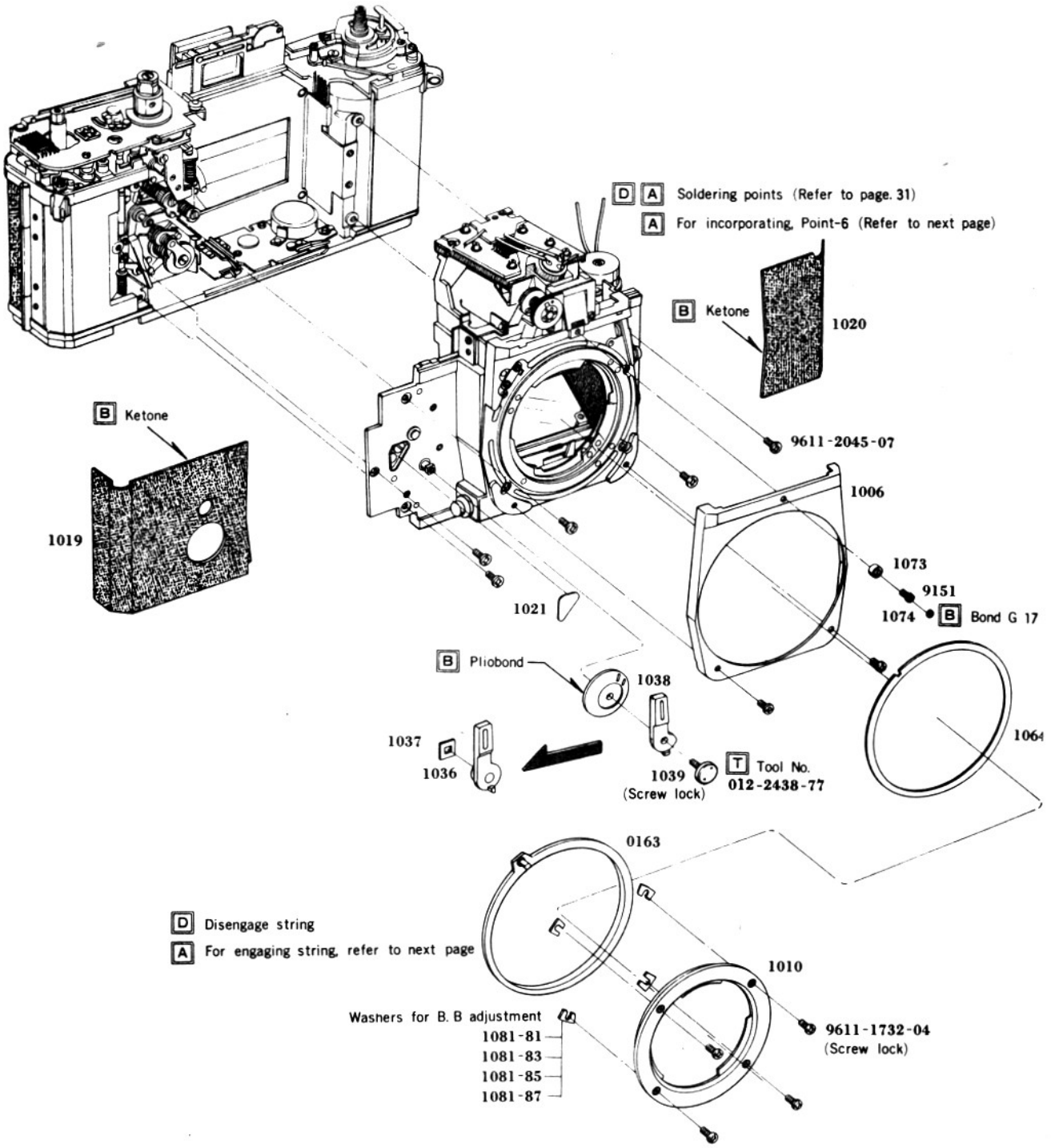
3. **Checking the mirror operation**

From the rear of the mirror box, operate the mirror several times and make sure that thechart image is within the rated values (45° ±20′) and that the chart image does not change.

4. **Checking the space of SW. 5 contacts**

After the adjustment of mirror angle, check the contact space of SW. 5. (Refer to Page. 22)

Body 10 Front Base Plate

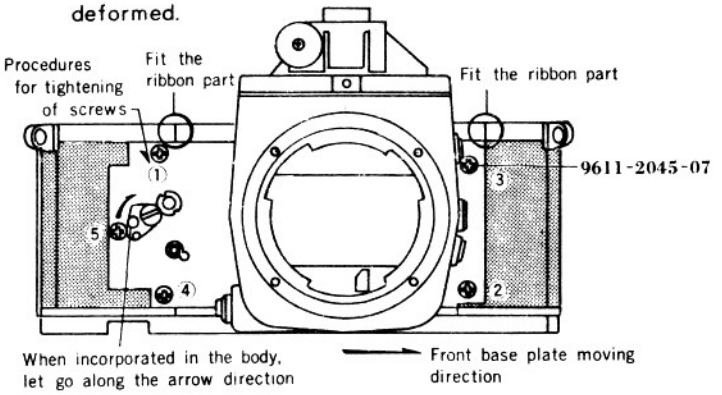


■After assembling

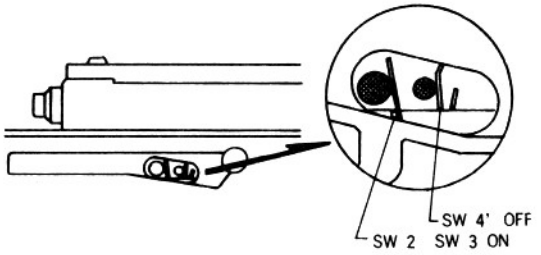
① Hold down the preset lever (0519) with finger, release the shutter, raise the mirror gradually and check if the shutter can be clicked.
If the shutter cannot be clicked, then the shutter block is incrrect or faulty.
② Adjust the self-timer. (Refer to next page. ☞)
③ Engage the diaphragm string. (Refer to next page. ☞)
④ Engage the SS designation string. (Refer to next page. ☞)

POINT-6 Incorporating of Front Base Plate Set

1. With the body in the state for film advance, attach SW 2, 3 and 4. Be careful not to cause SW to be deformed.

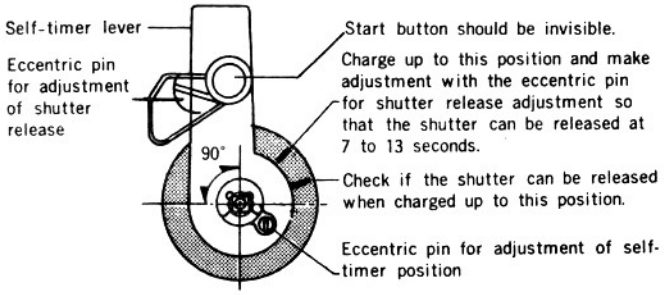

Procedures for tightening of screws
Fit the ribbon part
Fit the ribbon part
9611-2045-07
When incorporated in the body, let go along the arrow direction
Front base plate moving direction

2. After assembling the front base plate, click the shutter at "B" to ensure about ON and OFF of SW 2, SW 3 and SW 4.



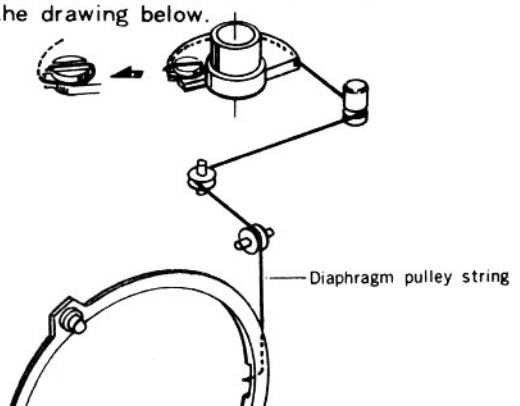
3. Check ON and OFF of the diaphragm reducing SW.

Adjustment of Self-Timer

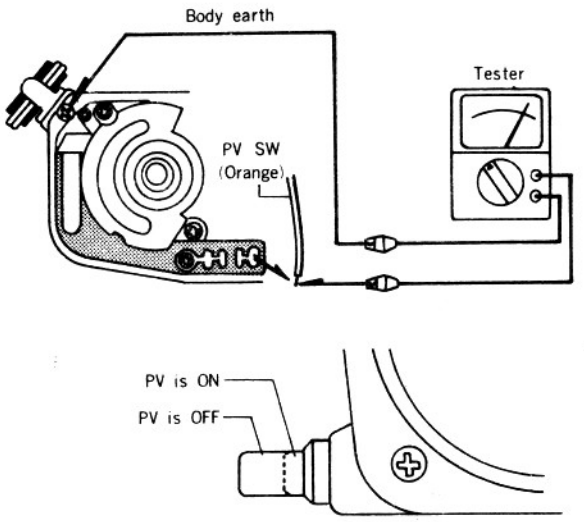

Self-timer lever
Eccentric pin for adjustment of shutter release
90°
Start button should be invisible.
Charge up to this position and make adjustment with the eccentric pin for shutter release adjustment so that the shutter can be released at 7 to 13 seconds.
Check if the shutter can be released when charged up to this position.
Eccentric pin for adjustment of self-timer position

Engagement of Diaphragm Pulley String

Engage the diaphragm pulley string as shown in the drawing below.



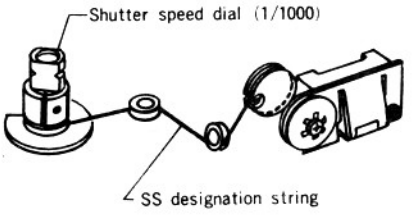
Confirmation of ON-OFF of Diaphragm Reduction



Disconnect the lead wire (orange) of PV SW, connect a tester between the lead wire and body earth, turn the diaphragm button ON and OFF to check if PV SW turns ON and OFF.

Engagement of S.S. Designation String

Set the speed dial at 1000 and engage the string as shown in the drawing below.

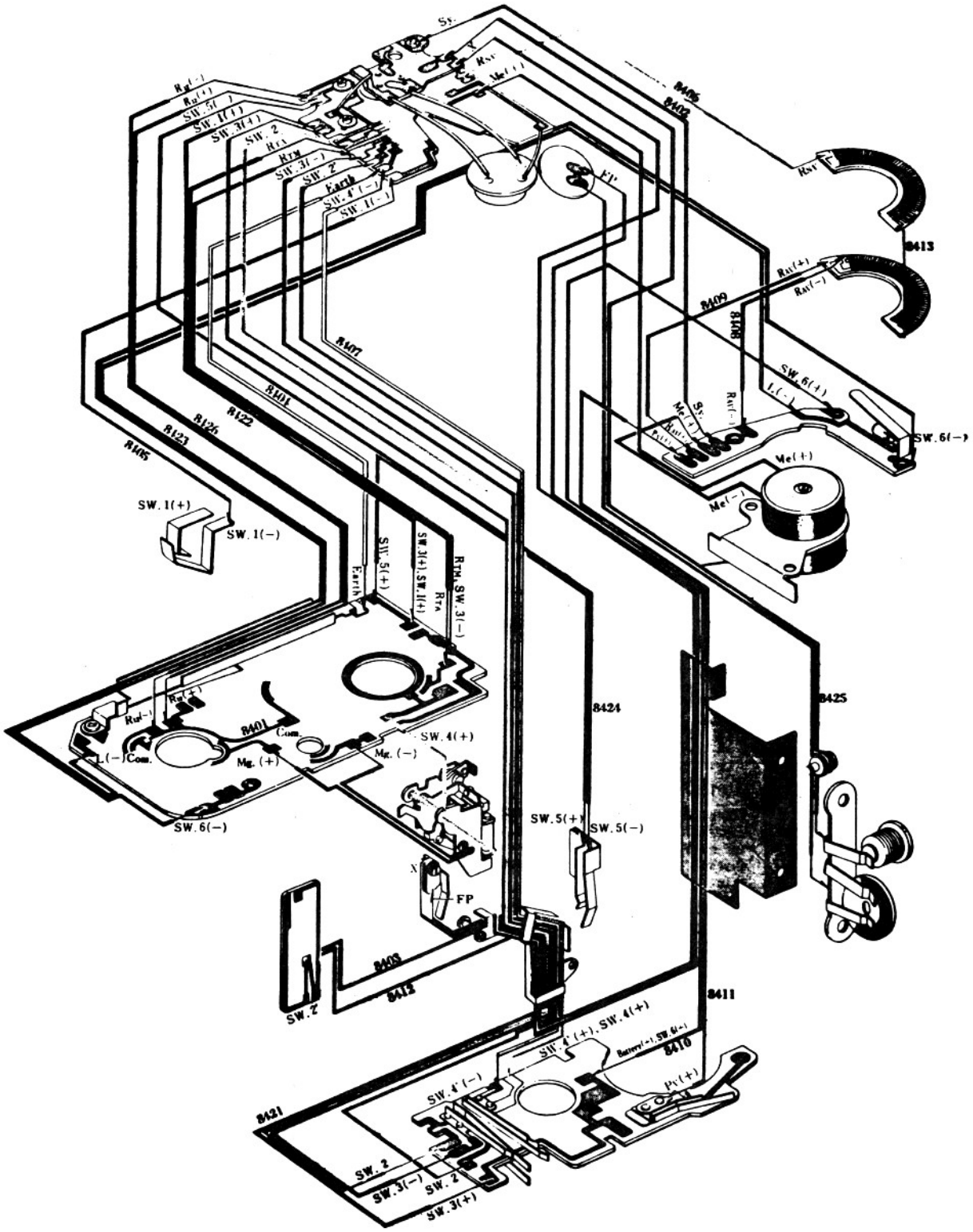


■After the adjustment of the self-timer, the engagement of the diaphragm pulley string and SS designation string, carry out the following adjustments:

- Adjustment of the body back (Refer to Page. 34)
- Adjustment of the finder back (Refer to Page. 35)
- Adjustment of the in-finder (Refer to Page. 36)
- Confirmation of the diaphragm (Av) sliding resistance and ASA (Sv) operation (Refer to Page. 37)

■With the above all finished, carry out soldering and arrange lead wires. (Refer to Page. 31)

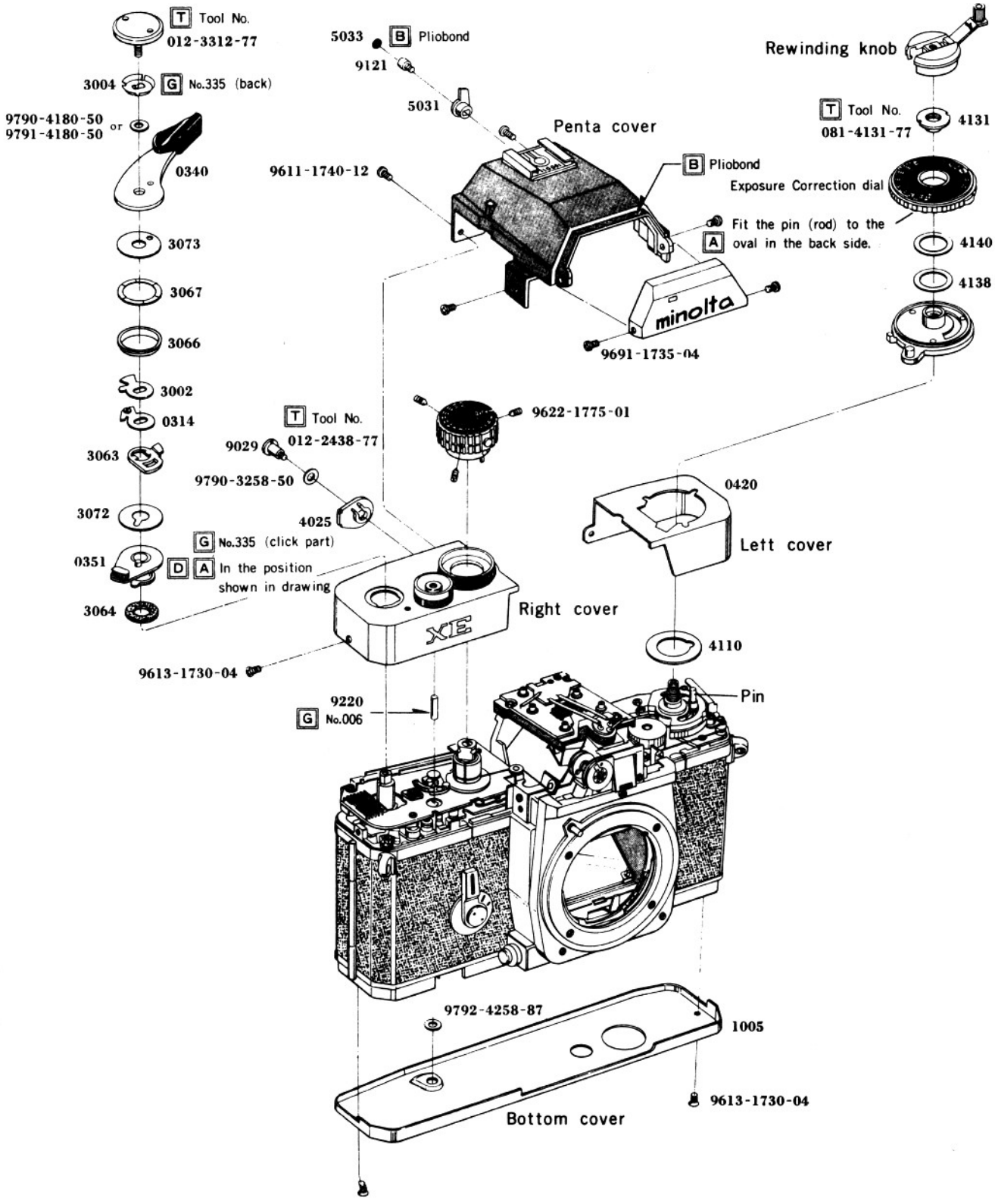
Soldering and Arrangement of Lead Wires



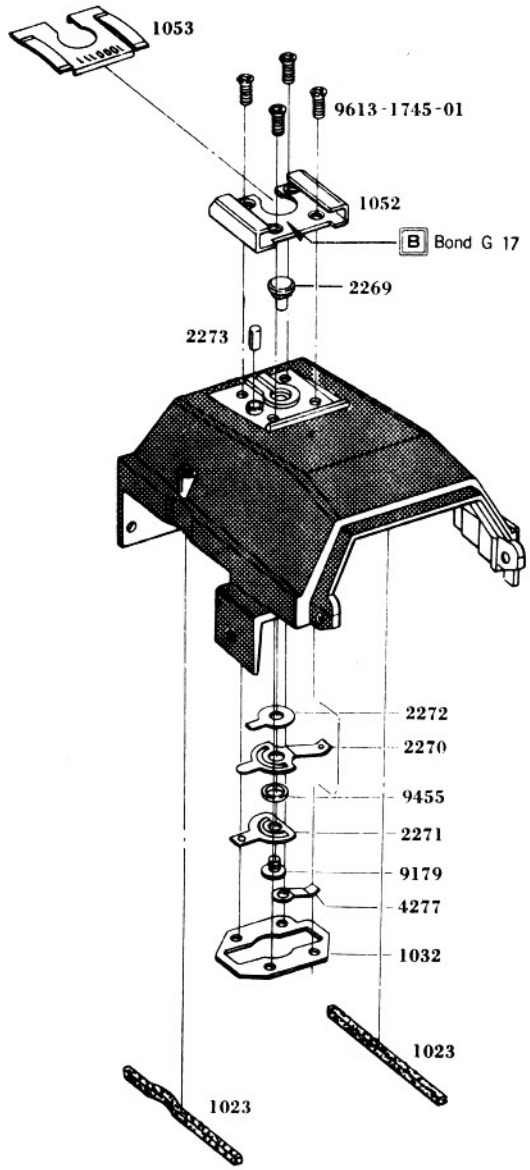
Body 11 Penta Cover, Left and Right Covers and Bottom Cover

■First attach the left cover, exposure correction dial and rewinding knob to the body, make the following adjustments and, after the adjustments are finished, complete the body.

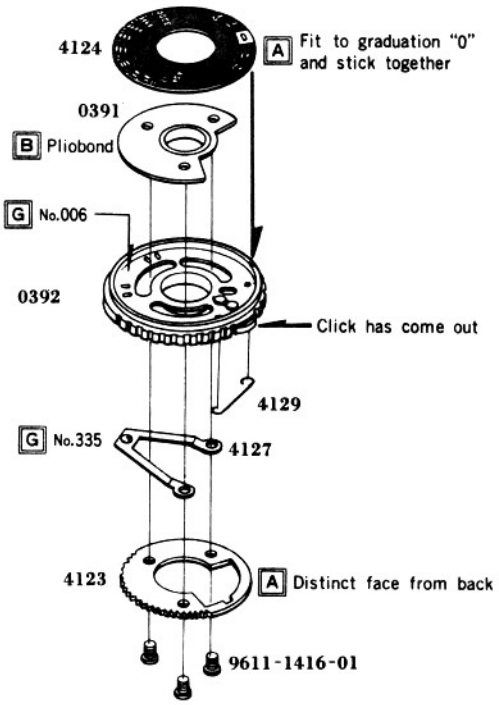
1. Manual split second timing adjustment (Refer to Page. 38)
2. Synchro time lag confirmation (Refer to Page. 39)
3. Minimum working voltage confirmation (Refer to Page. 40)
4. B. C. lamp voltage confirmation (Refer to Page. 40)
5. AUTO exposure adjustment (Refer to Page. 41)



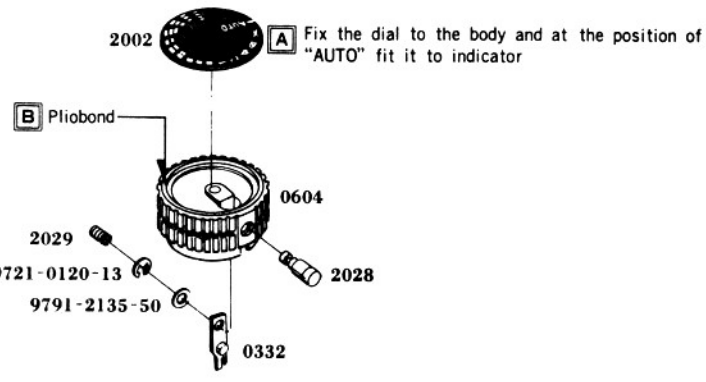
Penta Cover



Exposure Correction Dial



Shutter Speed Dial



■Adjustment of Finder Back

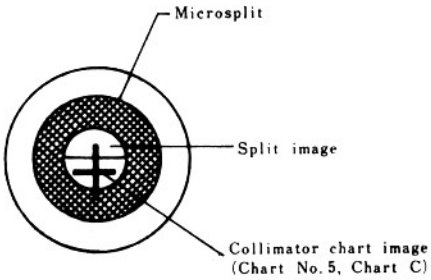
■Measuring instruments:

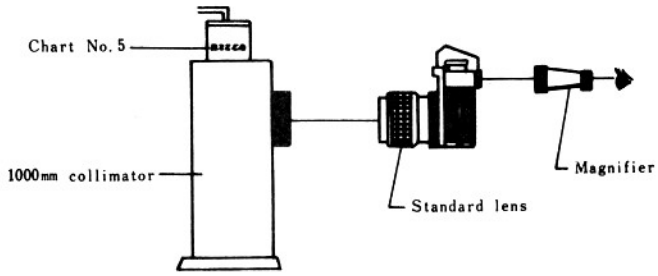
: 1000mm collimator (Model RC-1000 Ⅰ, Ⅱ, Ⅲ)
: Standard lens for adjustment of finder back (054-5202-79)
: Magnifier

■Standard value: 43.575±0.02mm

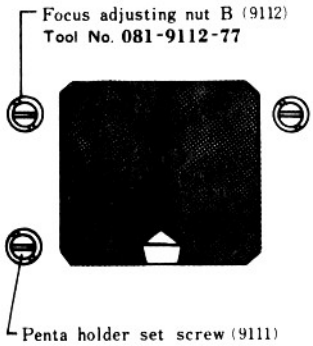
■Adjustment procedures:

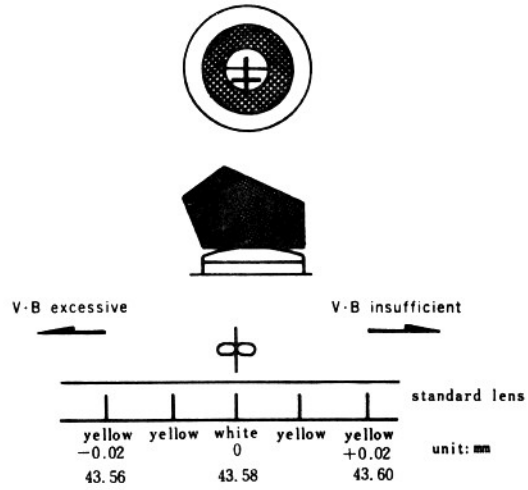
1. Set the body in a position where the chart image can be seen as in the figure below, and set the visibility of magnifier to the chart image.





2. In a condition where white lines of the standard lens coincide, loosen 3 set screws of the penta holder (9111 left screws), raise and lower uniformly the focus adjusting nut B (9112) and, at the position where the vertical lines of the chart image coincide, tighten 9111.



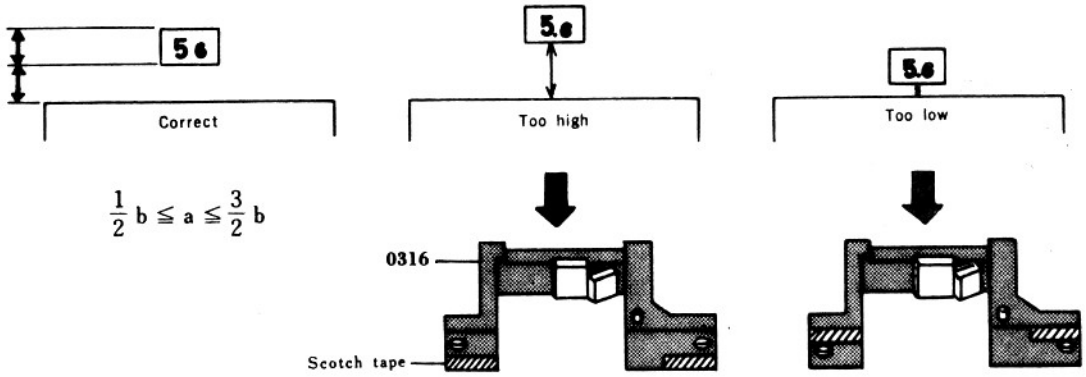


3. After the adjustment, operate the mirror several times, rotate of the standard lens, and make sure that, when vertical lines of the chart image coincide, the standard values (43.58±0.02mm) are not exceeded and that no "half fuzziness" is observed.

■Finder Adjustment

1. Adjustment of diaphragm-in finder

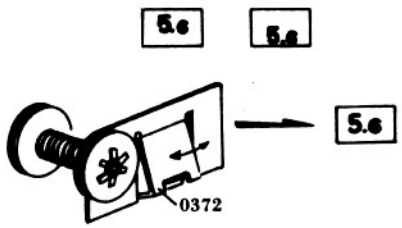
Attach the standard lens to the body, look in the finder with the diaphragm set at 5.6, make sure the position shown in the figures below is maintained and make adjustment if necessary.

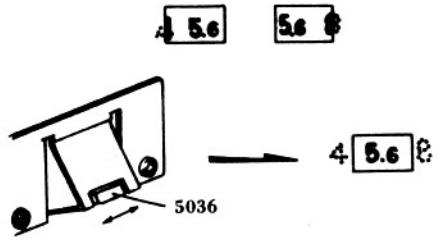


- If the frame of diaphragm-in finder is deviated higher or lower, make adjustment by sticking Scotch tape (0.1t) at the position of 0316 shown in the figure.

- If F 5.6 is not in the center of the frame but deviated up or down, bend 0372 back and forth as shown in the figure for adjustment.

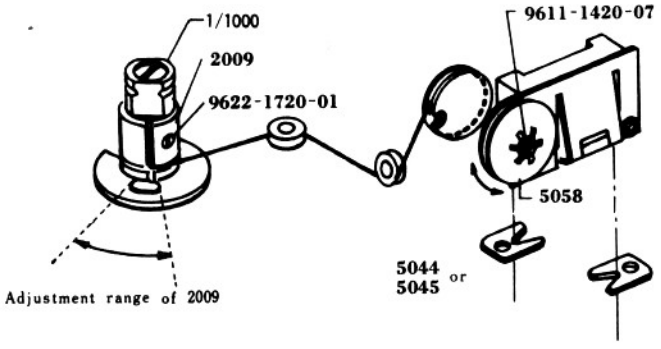
- If F 5.6 is not in the center of the frame but F 4 or F 8 is visible instead make adjustment by sliding 5036 horizontally and then glue it with paste.



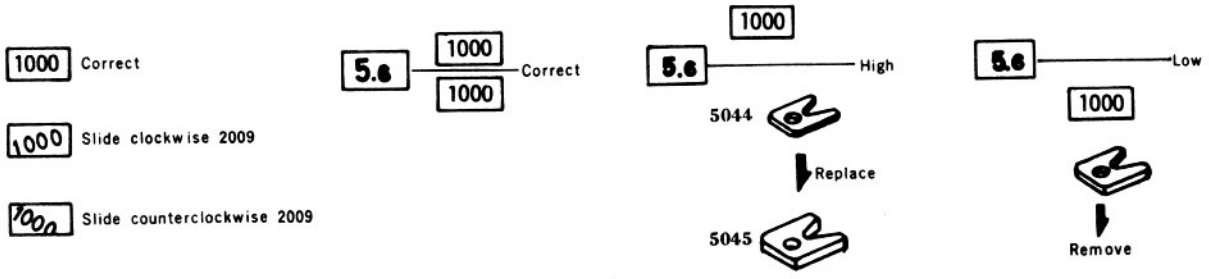


2. Adjustment of speed-in finder.

With the speed dial set at 1/1000, look in the finder to make sure that it is in the position shown in the figure below and make adjustment if necessary.



- If 1000 is deviated to left or right away from the center of the frame, loosen 9622-1720-01 and slide 2009 for adjustment. Also make sure of A (auto).
- When 2009 is shifted for adjustment, if 2009 is deviated beyond the range shown in the figure, loosen 9611-1420-07 and shift the position of 5058 for adjustment.
- If 1000 is deviated up or down away from the center of the frame, make adjustment by replacing or removing 5044 as shown in the figure.



■Confirmation of Operation of Diaphragm (Av) Sliding and ASA (Sv)

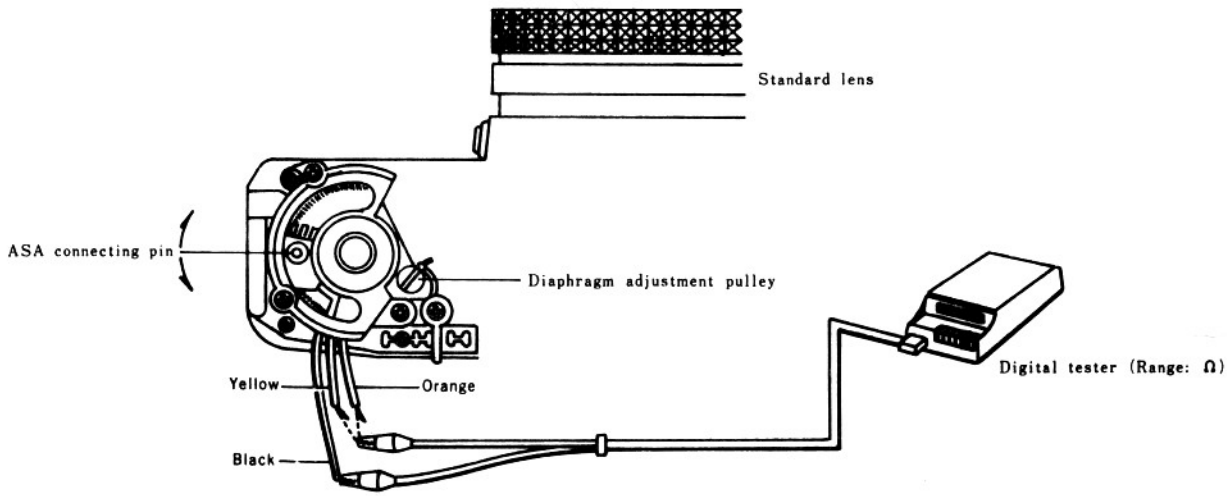
■Measuring instruments:

: Digital Tester (Type 2507) or ohmmeter
: Standard lens (50mm F 1.4)

■Standard value: 300±50Ω, at F 1.4 60±20Ω, without lens.

■Adjustment procedures:

1. **Adjustment of diaphragm (Av) resistance values.**
   Connect lead wires "Black" and "Orange" ASA diaphragm rub resistor (0232) as shown in the figure below, set the lens aperture at F 1.4 and by means of the diaphragm adjustment pulley (4104), adjust the resistance to the standard value (300±50)
2. **Diaphragm (Av) resistance value check.**
   Operate the diaphragm ring and check that no "leap" or "stalemate" in resistance value change is observed.
   Make sure that, if the diaphragm is returned slowly or quickly back to F 1.4 from outside of F 1.4, the resistance value remains within the standard value.
   Remove the lens and check if the resistance value remains 60±20Ω.
3. **ASA (Sv) check**
   Connect lead wires "Black" and "Yellow" of the ASA diaphragm rub resistor (0232) as shown in the figure below, attach the exposure correction dial, operate ASA connecting pin and make sure that no "leap" or "stalemate" exists in resistance value change.



■Manual Split-Second Timing Adjustment

■Measuring instruments:

: 081 standard circuit tester Model SC-1 or constant-voltage DC power scurce Model E-1 or E-2
: Shutter tester
: Power source adapter (081-4204-79)

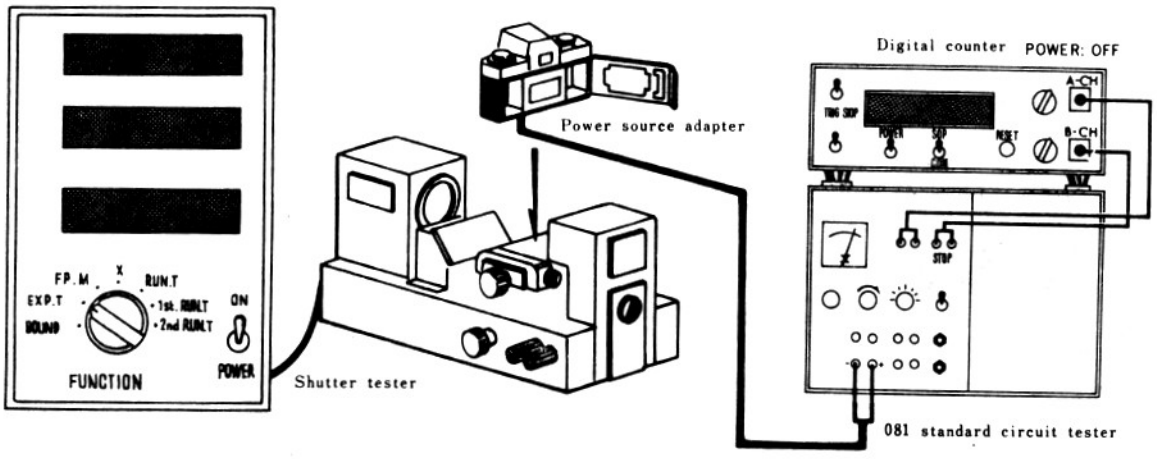
■Standard value:

Shutter speed	Standard value	Allowable value (±0.1Ev)
1/4	250ms	233~268ms
1/1000	0.98ms	0.91~1.05ms

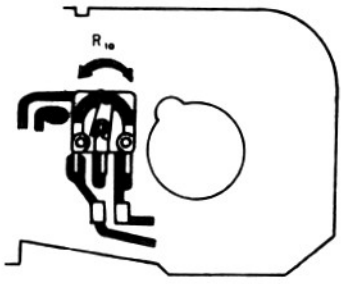
Note: Allowable values are central values of the shutter tester.

■Adjustment Procedures:

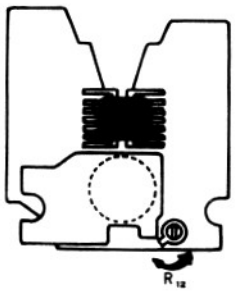
1. Set the measuring instruments as shown in the figures below and set the power source voltage at 3.0V.



2. Release the shutter at a speed of 1/4, and make adjustment by means of R_{10} (resistance for long split-second timing adjustment) so that the measured value may approach the standard (250ms). R_{10} loses speed when turne left and gains speed if turned right. (Refer to the figure below).



3. After 1/4 adjustment, release the shutter at a speed of 1/1000, make adjustment by means of R_{12} (resistance for short split-second timing adjustment) so that the measured value may approach the standard (0.98ms). R_{12} gains speed if turned left and loses speed if turned right. (Refer to the figure below).



■ When manual split-second timing is "OPENING" or "QUICK SHOOTING", for cause of trouble refer to the chart (P. 3)

■ If printed base plate A is replaced, make adjustment after each of variable resistances (R_1, R_2, R_3···) has been set approximately in the center.

■Confirmation of Synchro Time Lag

■Measuring instruments:

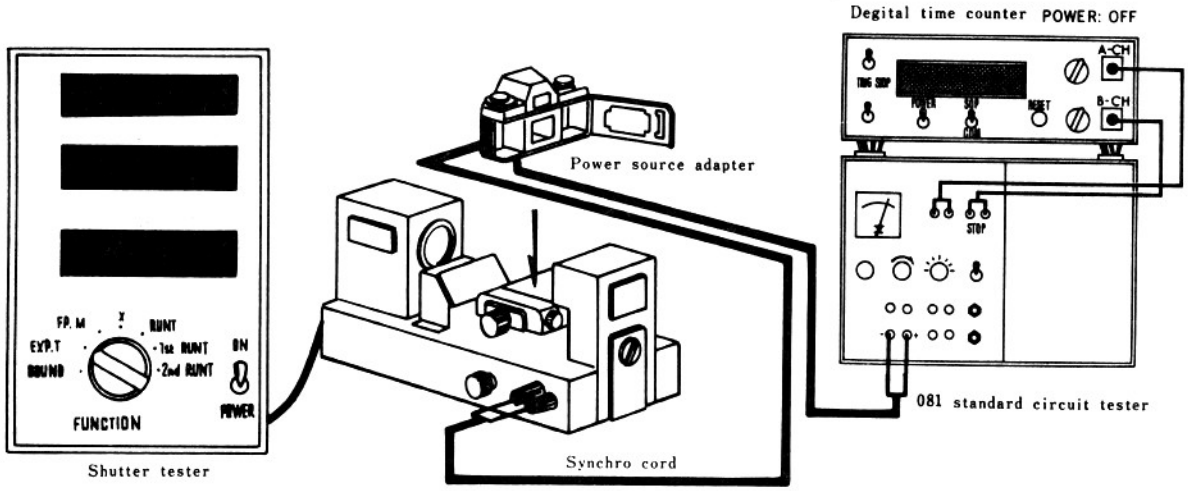
: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Shutter tester
: Power source adapter (081-4204-79)

■Standard value:

Synchro contact	Allowable value of time lag	
X	Range A	Over 0.4ms
	Range B	Over 2.0ms
FP	11~15ms	

■Checking procedures:

1. Set measuring instruments as shown in the figures below:



2. Confirmation of "FP" time lag
   Release the shutter at body shutter speed of 1/1000, synchro change SW (FP), shutter tester "FUNCTION" and power source voltage of 3V, and check that the measured value is within the standard (11~15ms).
3. Confirmation of "X" time lag
   Release the shutter at body shutter speed of X and with synchro change SW (X), shutter tester "FUNCTION" and power source OFF, and check that the measured value is within the standard (Range A: over 0.4ms, Range B: over 2.0ms).

■If the measured value of time lag of FP and X each is beyond standard, check the shutter block. (Refer to P. 50)

■Confirmation of Minimum Working Voltage

■Measuring instruments:

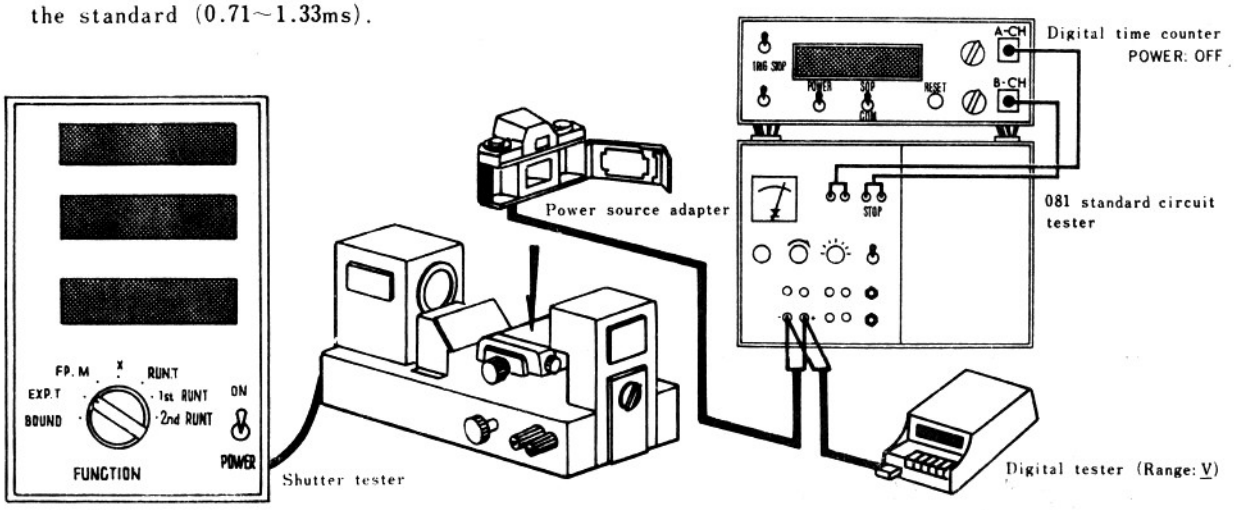
: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Shutter tester
: Digital tester (Type 2507) or DC ammeter
: Power source adapter (081-4204-79)

■Standard value

Shutter speed	Standard value	Allowable value (±0.45Ev)
1/1000	0.98ms	0.71~1.33ms

■Checking procedures:

1. Set the measuring instruments as shown in the figure below, and set the power source voltage at 1.70V. Release the shutter at a speed of 1/1000 and check that the measured value is within the standard (0.71~1.33ms).



■If the measured value is beyond the standard, readjust the manual split-second timing or check the shutter block.

■Confirmation of B. C. Lamp Lighting Voltage

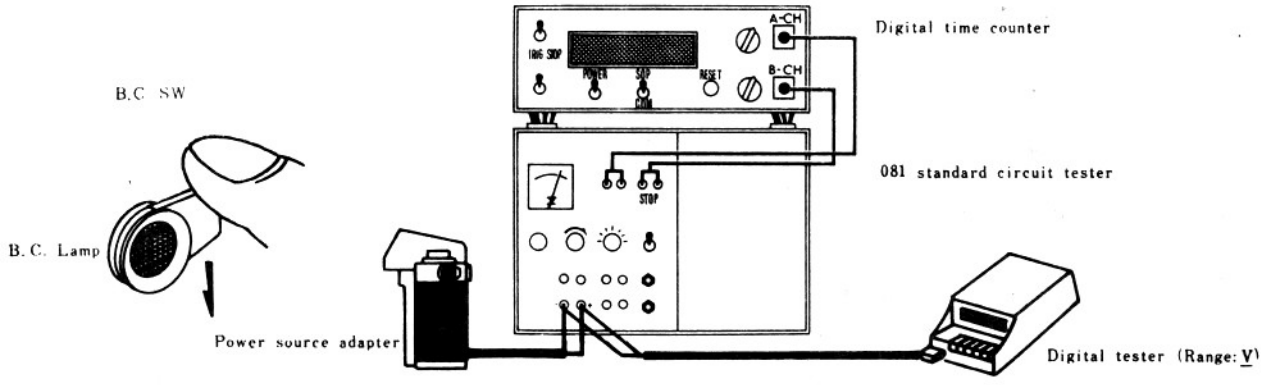
■Measuring instruments:

: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Digital tester (Type 2507) or DC ammeter
: Power source adapter (081-4204-79)

■Standard value: Lighting at over 1.71~2.0V

■Checking procedures:

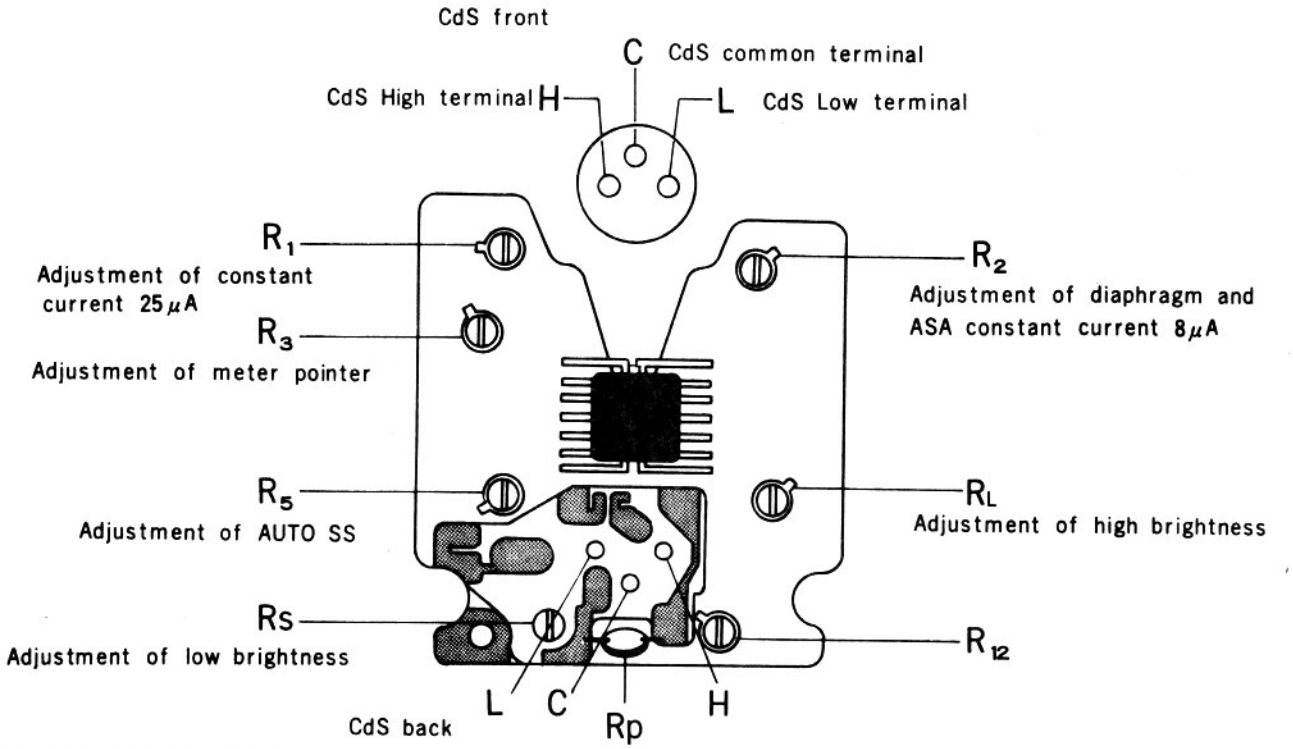
1. Set the measuring instruments as showin in the figure below, and set the power source voltage at 1.7V, turn down B.C. SW in the arrow direction and make sure that B.C. lamp is "out". Next, set the power source voltage at 2.0V, turn down B.C. SW in the arrow direction and see if the B.C. lamp is lighted.



■If B.C. lamp is not put out or lighted, refer to the troubleshooting chart. (Refer to P. 2)

■Adjustment of AUTO Exposure

■各可変抵抗と，その調整，測定項目



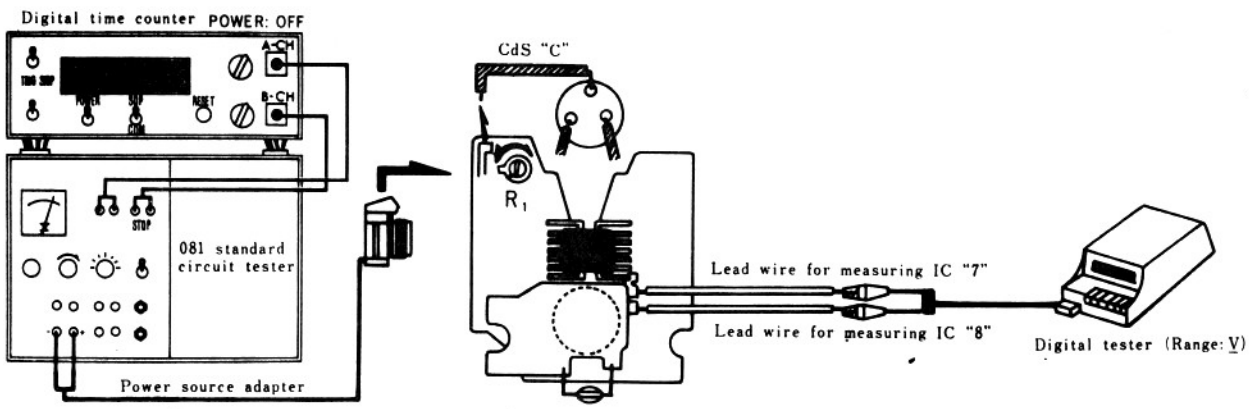
1 Adjustment of R_1 —Adjustment of constant current 25μA—

■Measuring instruments:

: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Digital tester (Type 2507)
: Power source adapter (081-4204-79)
: Screw-driver for brightness calibration

■Adjustment procedures:

1. As shown in the figure below, connect lead wires for measuring to IC terminals "7" and "8" of the printed base plate A (0432) and disconnect the soldering at the terminal "C" of CdS front.
2. Set the measuring instruments as shown in the figure below and set the power source voltage at 3.0V.



3. Turn R_1 and make adjustment so that voltage (mV) of IC terminals "7" and "8" of the printed base plate A (0432) may be of the value shown in the table below. Voltage decreases if R_1 is turned right and it increases if R_1 is turned left.

Ambient temperature	10～20℃	20～30℃	30～40℃
Voltage (mV)	375± 1	388± 1	398± 1

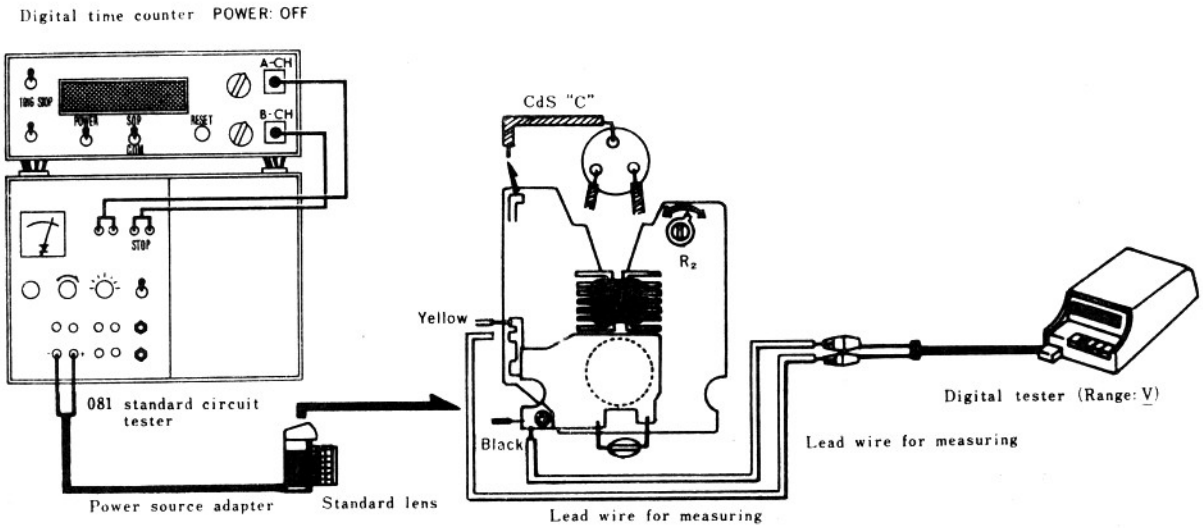
2 Adjustment of R_2 —Adjustment of diaphragm, ASA constant current 8μA—

■Measuring instruments:

: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Digital tester Type 2507
: Power source adapter (081-4204-79)
: Standard lens (50mm F 1.4)
: Screw-driver for brightness calibration

■Adjustment procedures:

1. As shown in the figure below, connect lead wires for measuring to PV SW pattern and earth pattern of the printed base plate A (0432), and disconnect the soldering at "C" terminal of CdS front.
2. Set the measuring instruments as shown in the figure below and set the power source voltage at 3.0V.



3. With Pv button of the body depressed (Pv SW: ON), measure voltages (mV) for lens F 2.8 and for lens F 16, and make adjustment by means of R_2 so that the difference will be of the value shown in the table below. Voltage decreses if R_2 is turned right and it increases if R_2 is turned left.

Ambient temperature	10~20℃	20~30℃	30~40℃
Voltage difference (mV)	87.0± 1	90.0± 1	93.0± 1

4. Confirmation of R_{AV}
Turn the diaphragm dial and make sure that voltage differences per 1 Ev measured between F 2.8 and F 16 are as shown in the table below:

Ambient temperature	10~20℃	20~30℃	30~40℃
Voltage difference (mV)	17.4± 3	18.0± 3	18.6± 3

5. Confirmation of R_{SV}
Turn ASA dial and make sure that voltage differences per 1 Ev measured between 12 and 3200 are as shown in the table below:

Ambient temperature	10~20℃	20~30℃	30~40℃
Voltage difference (mV)	17.4± 3	18.0± 3	18.6± 3

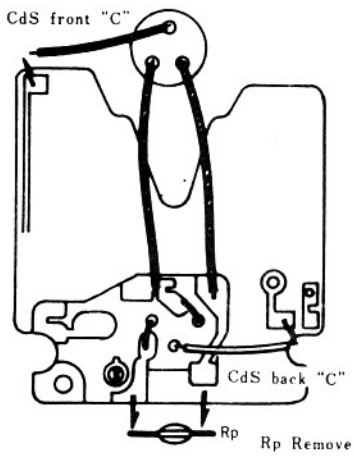
3 Measuring of CdS Resistance Value and Selection of Rp

■Measuring instruments:

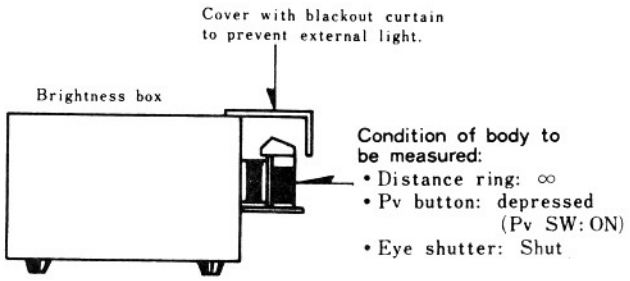
: Digital tester (Type 2507)
: Brightness box (Model L-222 or L-223)
: Standard lens (50mm F 1.4)
: ND filter MINOLTA ND 50% for Adjustment

■Measuring procedures:

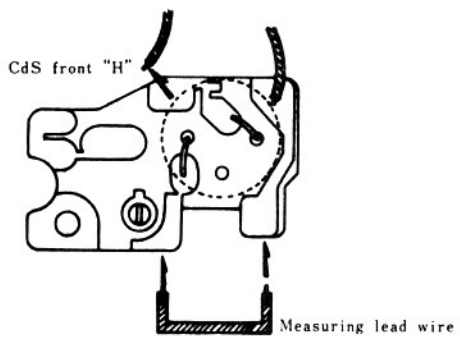
1. As shown in the figure below, disconnect the soldering at Rp and terminal "C" of CdS (front and back) of the printed base plate A (0432).

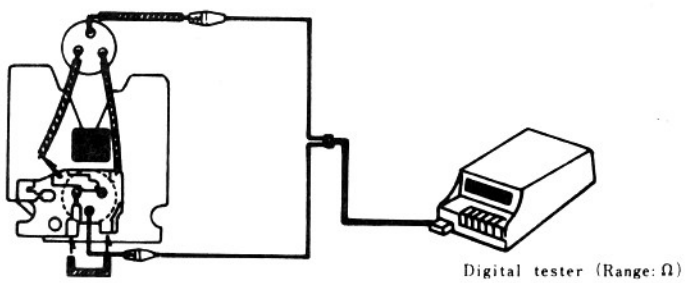


Rp Remove solder while letting Rp radiate. (Use a pair of tweezers or the like).

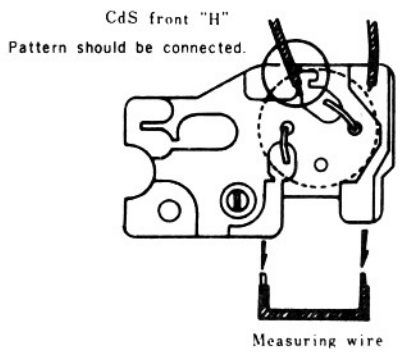

Cover with blackout curtain to prevent external light.
Brightness box
Condition of body to be measured:
• Distance ring: ∞
• Pv button: depressed (Pv SW: ON)
• Eye shutter: Shut

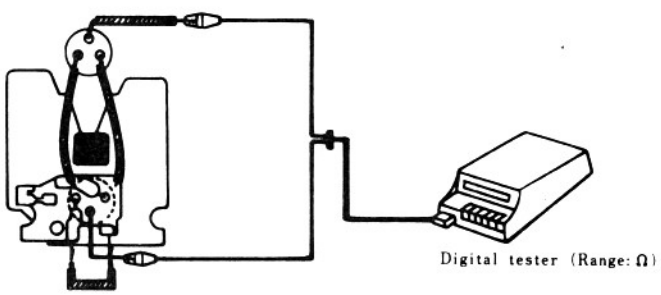
2. **Measuring of resistance value of $R_{LL\ BV0}$** (Resistance value should be within 88~340KΩ). Connect between "L"s of CdS (front and back) the measuring wire, remove the solder at "H" terminal of CdS front and connect the digital tester to "C" of CdS (front and back). Set the measuring range at "Ω" and measure the resistance value at Brightness Ev 5 (ASA 100).





3. **Measuring of resistance value of $R_{LL\ BV5}$** (Resistance value should be within 16~40KΩ). Carry out the same connection for CdS as described above, set ND filter to the body and measure the resistance value at Brightness Ev 11 (ASA 100).
4. **$R_{HH\ BV5}$ Resistance Value Measurement** (Resistance value should be within 128~480KΩ). Maintain the brightness, ND filter and "C" of CdS all the same as in the case of $R_{LL\ BV5}$, solder the terminal "H" of CdS (front), remove the solder of measuring wire and measure and measure the resistance value.

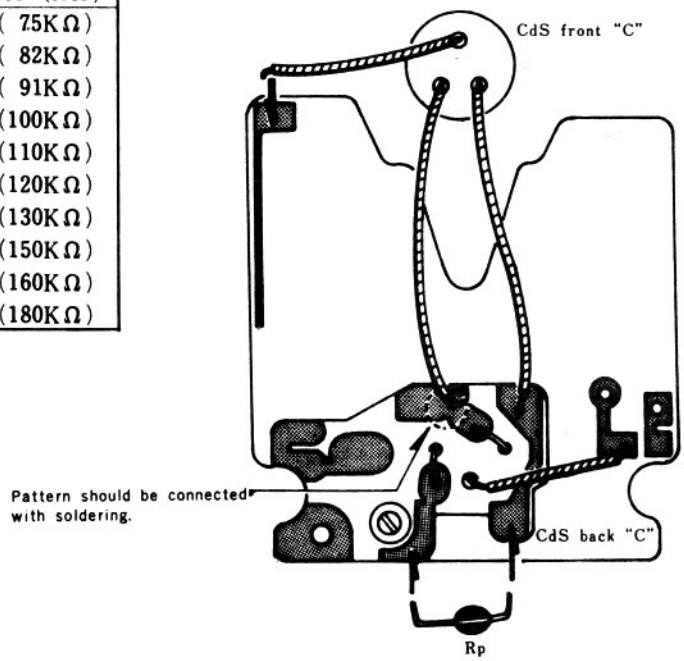




■Selection of Rp

1. Find the resistance value of Rp according to the attached data or calculating formula with each resistant value obtained in the measurement of $R_{LL\ BV5}$ and $R_{HH\ BV5}$.
2. Select from the table below the resistance closest to the resistance value obtained by the attached data or calculating formula and solder the terminal "C" and Rp.

Rp resistance (KΩ)	Rp available (KΩ)
78>Rp	081-8312 (75KΩ)
78≦Rp< 86	081-8313 (82KΩ)
86≦Rp< 95	081-8314 (91KΩ)
95≦Rp<105	081-8315 (100KΩ)
105≦Rp<115	081-8316 (110KΩ)
115≦Rp<125	081-8317 (120KΩ)
125≦Rp<140	081-8318 (130KΩ)
140≦Rp<155	081-8319 (150KΩ)
155≦Rp<170	081-8320 (160KΩ)
170≦Rp	081-8321 (180KΩ)



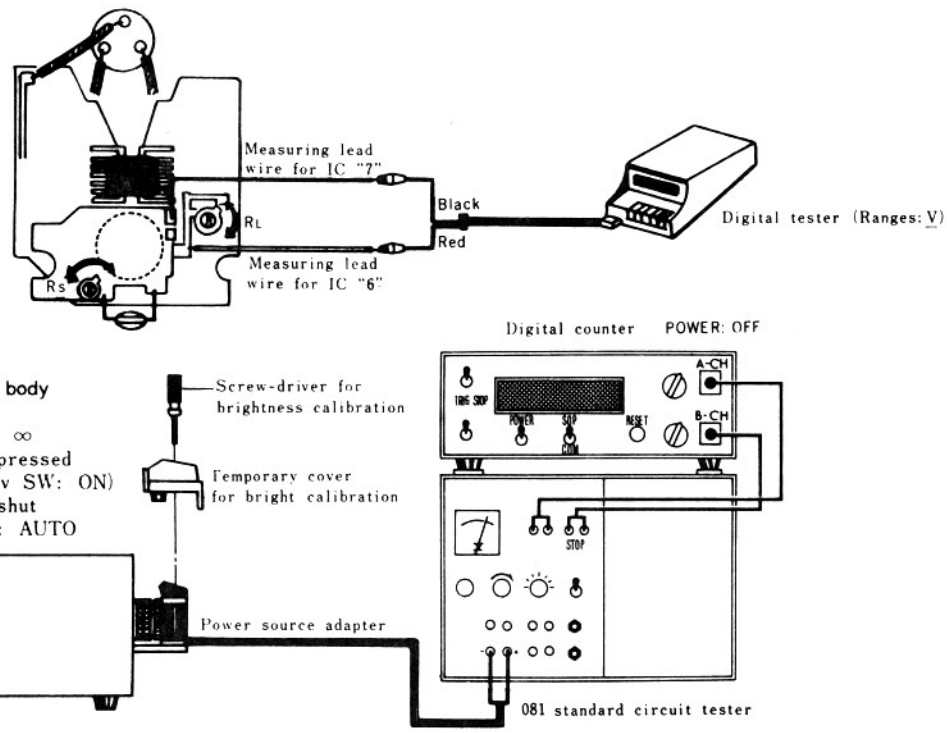
4 Adjustment of Rs and R_L —Adjustment of low brightness and high brightness—

■Measuring instruments:

: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source Model E-1 or E-2
: Digital tester (Type 2507)
: Brightness box (Model L-222 or L-223)
: Power source adapter (081-4204-79)
: Standard lens (50mm F 1.4)
: Temporary cover for brightness calibration (081-1031-79)
: Screw-driver for brightness calibration

■Adjustment procedures:

1. As shown in the figure below, connect the measuring lead wires to IC terminals "6" and "7" of the printed base plate A (0432) and set the camera to the measuring apparatus.



2. **Adjustment of Rs**

Set the brightness box at Ev 5 (ASA 100), wait about 1 minute, and according to the table below make correction-for-temperature of $V_{BO\,0}$ voltage obtained by attached data or calculating formula from the voltage between IC terminals "6" and "7". Then turn Rs to coincide with the value of $V_{BV\,0}$ (mV) which has been corrected. Voltage drops if Rs turned right and it rises if Rs is turned left.

—Correction for temperature of $V_{BV\,0}$—

Ambient temperature	10±2.5℃	15±2.5℃	20±2.5℃	25±2.5℃	30±2.5℃	35±2.5℃	40±2.5℃
Correction value (mV)	−13.5	−9.0	−4.5	0	+4.5	+9.0	+13.5

3. **Adjustment of R_L**

Set the brightness box at Ev 15 (ASA 100), wait for more than 5 minutes, make correction-for-temperature according to the table below of the voltage value obtained by the attached data or calculating formula from the voltage between IC terminals "6" and "7". Then turn R_L to the voltage value of $V_{BV\,10}$ (mV) which has been corrected.

—Correction for temperature of $V_{BV\,10}$—

Ambient temperature	10±2.5℃	15±2.5℃	20±2.5℃	25±2.5℃	30±2.5℃	35±2.5℃	40±2.5℃
Correction value (mV)	−4.5	−3.0	−1.5	0	+1.5	+3.0	+4.5

※Adjust Rs and R_L repeatedly.

5 Adjustment of R_5

■Measuring instruments:

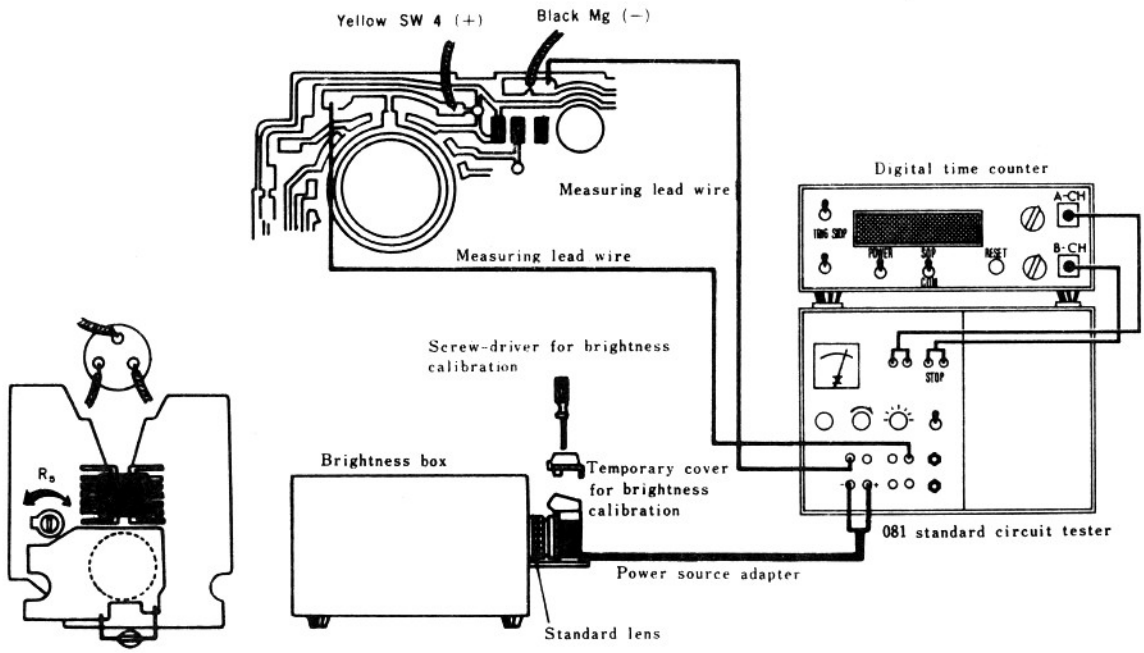
: 081 standard circuit tester (Model SC-1)
: Digital time counter (Model TC-1)
: Brightness box (Model L-222 or L-223)
: Power source adapter (081-4204-79)
: Standard lens (50mm F 1.4)
: Temporary cover for brightness calibration (081-1031-79)
: Screw-driver for brightness calibration
: ND filter (Minolta ND 50% for adjustment)

■Standard value:

: 63.5ms±0.1Ev (59.3~68.1ms) which is at brightness: Ev 10, ASA 100 (BV5): ASA sensivity: 100 (SV 5) and diaphragm: F 8 (AV 6).

■Adjustment procedures:

1. As shown in the figure below, connect measuring lead wires to SW 4 (+ side) and Mg. (− side) of the printed base plate, and set them to the measuring apparatus.



Setting of body and measuring apparatus

- **Body**
  - Speed dial : AUTO
  - ASA dial : 100
  - Ev correction graduation: 0
  - Pv button : depressed condition (Pv SW: ON)
  - Power switch : ON
  - Eye shutter: : shut
- **Standard lens**
  - Distance ring : ∞
  - Diaphragm : F 8
  - ND filter : attached
- **Digital counter**
  - SEP-COM SW: SEP
  - Trigger level A-Ch: +1(V)
    B-Ch: +1(V)
  - Trigger slope A-Ch: −
    B-Ch: +
- **081 standard circuit tester**
  - V-SEL SW: 3.0V
  - SS-SEL SW: A
- **Brightness box**
  - Brightness: Ev 11 (ASA 100)

2. Release the shutter and turn R_5 so that the digital time counter will be within the standard values (59.3~68.1ms). Shutter speed gains if R_5 is turned left.

6 Adjustment of R_3 —Adjustment of meter pointer—

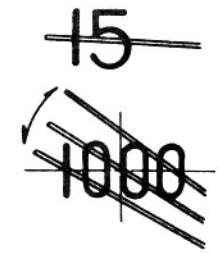
■Measuring instruments:

: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Brightness box (Model L-222 or L-223)
: Power source adapter (081-4204-79)
: Standard lens 50mm F 1.4)
: Temporary cover for brightness calibration (081-1031-79)
: Screw-driver for brightness calibration

■Standard value:

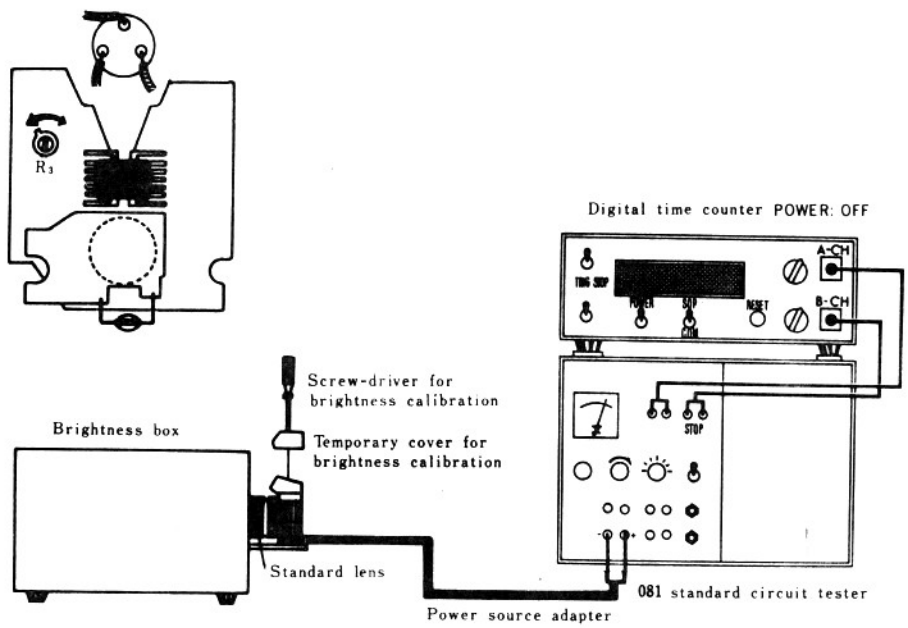
〔1〕 Brightness : Ev 11 ASA 100 (BV 6)
ASA sensitivity : 100 (SV 5) } Pointer position
Diaphragm aperture: F 11 (AV 7)

〔2〕 Brightness : Ev 15, ASA 100 (BV 10)
ASA sensitivity : 100 (SV 5) } Pointer position
Diaphragm aperture: F 5.6 (AV 5)



■Adjustment procedures:

1. Set the measuring apparatus as shown in the figure below and set the power source voltage at 3.0V.



2. Set the body PV button depressed (PV SW: ON) and the standard lens at.
3. With the brightness box: Ev 11 (ASA 100) and the standard lens: F 11, look in the finder and make adjustment by means of R_3 so that the meter pointer be in the position for standard value 〔1〕. The pointer moves up if R_3 is turned right and moves down if R_3 is turned left.
4. With the brightness box: Ev 15 (ASA 100) and standard lens: F 5.6, look in the finder and check to see that the meter pointer is within the range of standard value 〔2〕.
5. If the meter pointer is not within the range of standard value 〔2〕 when Ev 15 (ASA 100) is set, make adjustment by parting with Ev 11 (ASA 100).

■Shutter Block Performances Check

■Checking points:

1. Confirmation of manual split-second timing
2. Confirmation of chattering of SW. 4
3. Confirmation of Mg attracting voltage
4. Confirmation of synchro time lag

1 Confirmation of manual split-second timing

■Measuring instruments:

: 081 standard circuit tester (Model SC-1)
: Digital time counter (Model TC-1)
: Shutter tester

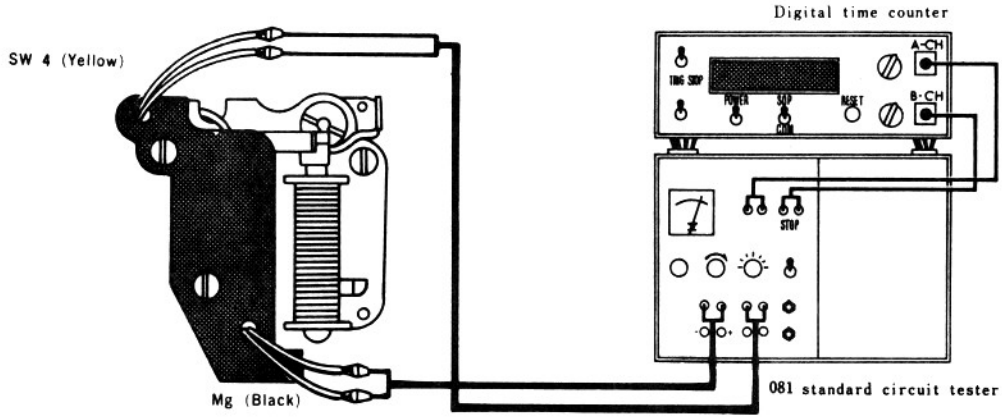
■Standard value:

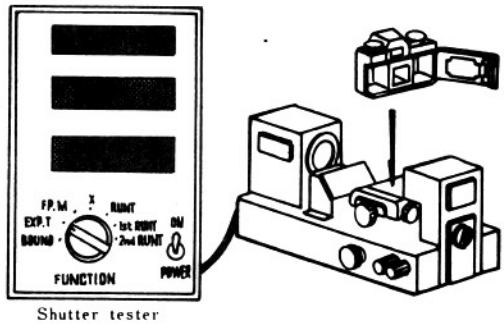
"SS SEL" set position of 081 standard avometer	Indication of shutter tester		CR time
	Standard value	Allowable value	
1/1	1000ms	758~1320ms (±0.4Ev)	1 s
1/4	250ms	189~330ms (±0.4Ev)	251ms
1/1000	0.98ms	0.563~1.71ms (±0.8Ev)	2 ms

Note: Allowable values are central values of shutter tester. For unevenness refer to inspection standard.

■Checking procedures:

1. Incorporate the shutter into the body, and connect lead wires of SW. 4 and Mg of the shutter block to 081 standard avometer as shown in the figure below.





Shutter tester

Setting of measuring instruments
- Digital time counter
  SEP-COM SW: SEP
  Trigger level A-CH: +1(V)
  B-CH: +1(V)
  Trigger slope A-CH: +
  B-CH: +
- Shutter tester
  Curtain traveling direction: DOWN
  FUNCTION: EXP-T
- 081 standard avometer
  SS SEL: 1, 1/4, 1/1000
  V SEL: 3.0V

2. Check that measured values for 1/1, 1/4 and 1/1000 are within standard values.
   Note: Digital time indication may vary depending on chattering of SW. 4.

2 Confirmation of Chattering of SW. 4

■Measuring instruments:

: 081 standard circuit tester (Model SC-1)
: Digital time counter (Model TC-1)

■Standard value:

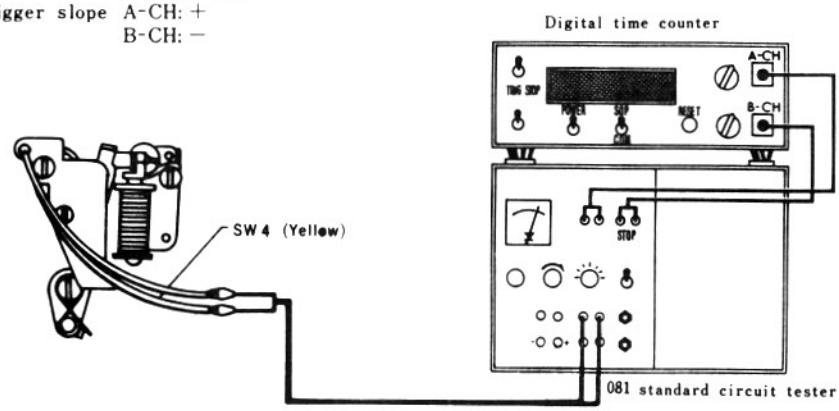
1/1000	1.0±0.05ms

■Checking procedures:

1. Incorporate the shutter block into the body and connect lead wires of SW. 4 to the 081 standard avometer as shown in the figure below.

Setting of measuring instruments
• Digital time counter
SEP-COMSW: SEP
Trigger level A-CH: +1(V)
B-CH: +1(V)
Trigger slope A-CH: +
B-CH: −

• 081 standard circuit tester
SS SEL: S 4 CAL
S 4 SW: 1/1000



2. Check that measured values of 1/1000 and 1/60 are within the standard.

3 Confirmation of Mg attracting voltage

■Measuring instruments:

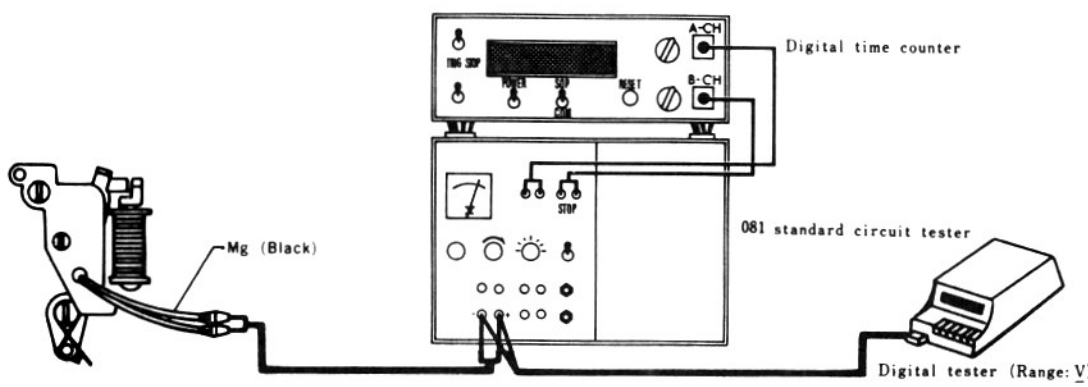
: 081 standard circuit tester (Model SC-1) or constant-voltage DC power source (Model E-1 or E-2)
: Digital tester (Type 2507) or DC ammeter

■Standard value:

: At 1.68V, magnet should be attracted
: At 1.67V, magnet may not be attracted

■Checking procedures:

1. As shown in the figure below, connect lead wires of Mg of the shutter block, release the shutter at power source voltages of 1.68V and 1.67V to see if the standard is satisfied.



3 Confirmation of synchro time lag

■Measuring instruments:

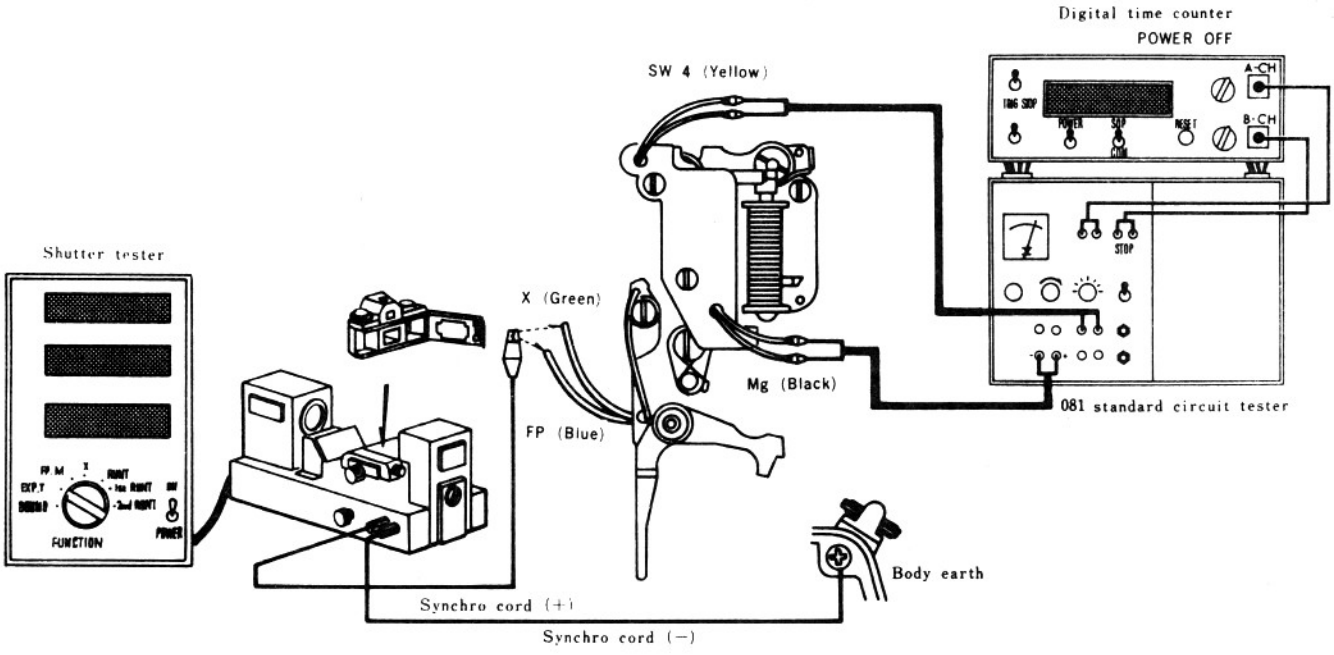
: 081 standard circuit tester (Model SC-1)
: Shutter tester

■Standard value:

Synchro contact	Allowable time lag	
X	Range A	Over 0.4ms
	Range B	Over 2.0ms
FP	11~15ms	

■Checking procedures:

1. As shown in the figure below, connect lead wires of SW. 4 and Mg of the shutter block to the 081 standard avometer and set them to the shutter tester.



2. Checking of FP time lag
   Connect the "Blue" lead wire of the shutter block to the synchro terminal (+) side of the shutter tester, connect (−) side to the body earth, set the 081 standard avometer at ("V-SEV" dial: 3V, "SS SEL" dial: 1000), push "RESET SW" to release the shutter and then make sure that the measured value is within the standard (11~15ms).
3. Checking of X time lag
   Connect the "Green" lead wire of shutter block to the synchro terminal (+) side of the shutter tester, connect (−) side to the body earth and turn "OFF" the power source of the 081 standard avometer. Release the shutter and check that the measured value is within the standard (Range A: over 0.4ms and Range B: over 2.0ms).

Wiring Schematic Diagram

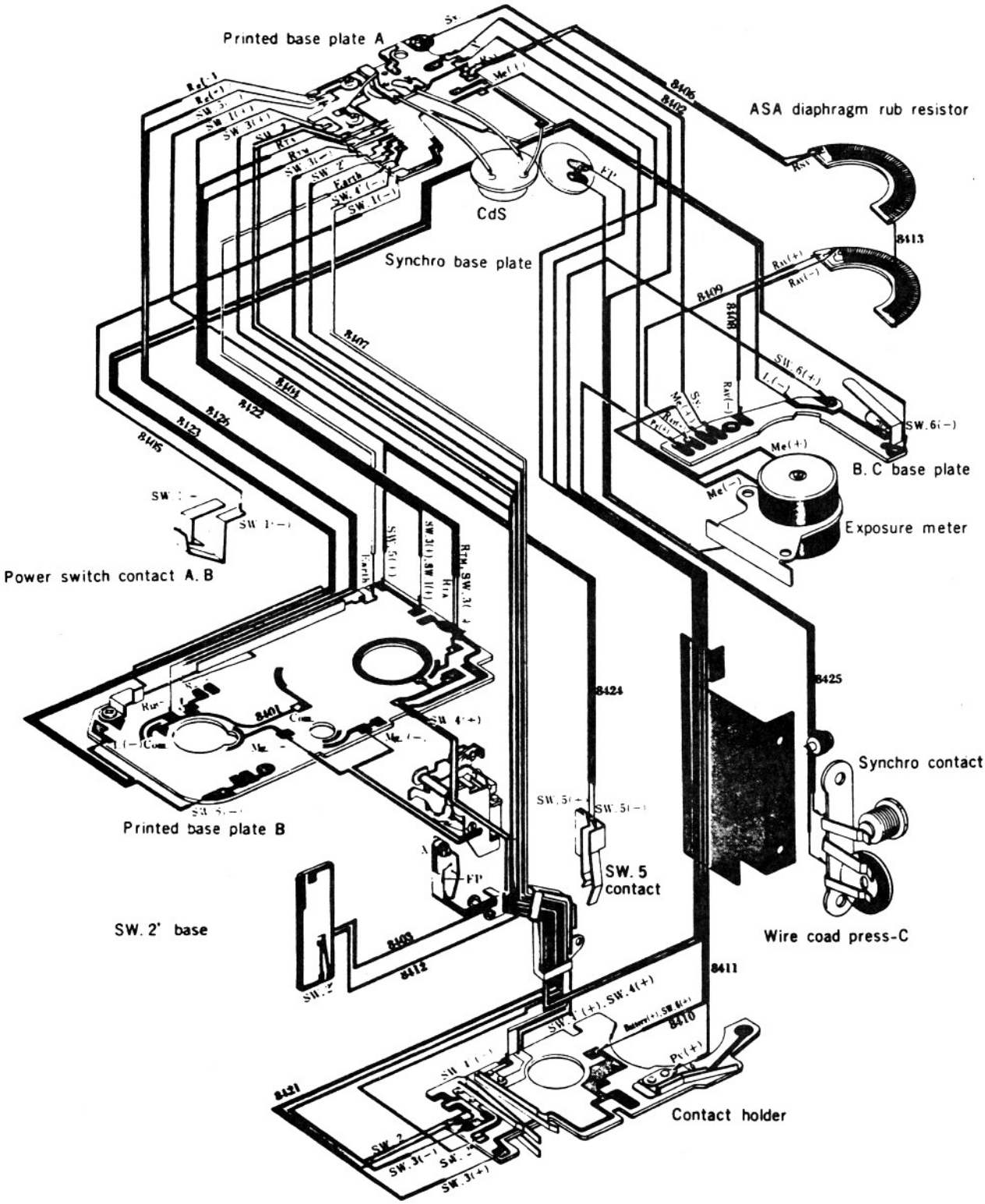


Chart of Trouble Causes

■Descriptions on Contents

1. The patterns described herein are single causes only but do not cover all possible causes. Make a comprehensive study of multiple causes of trouble based on the preceding single causes.
2. Herein mentioned are principally electrical causes of trouble, excluding mechanical causes.
3. The causes of trouble enclosed in a solid-line frame (▭) indicate the state in the normal condition.
4. The causes of trouble enclosed in a dotted-line frame (▭) indicate the state in an inferior condition.

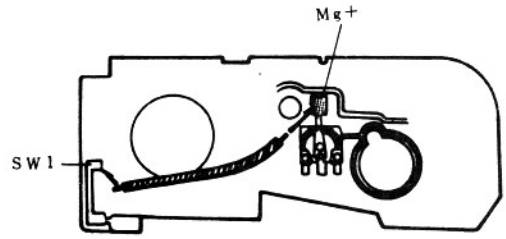
■Cautions on Trouble-Finding Work

1. Use the digital tester (Type 2507) basically as a measuring instrument; any other measuring instrument with an input impedance of 10MΩ or more may be used.
2. Since the electric parts, such as ICs, diodes, resistors, condensers, etc., are considered trouble-free, put an exphasis on defective soldering, switches, etc., as the causes of trouble.
3. When confirming defective soldering do not press the parts unnecessaily or pull the lead wires forcibly.
4. The most suitable temperature of a soldering iron tip is 300～350°C at base plate A and about 250°C at base plate B. If, however, said temperature be unobtainable, be sure to finish soldering in a short time.

■Contents

A. At high-speed shutter release (1/1000 sec., 1/500 sec.), variations occur in the shutter speed. ····· 2
B. Batteries become dead quickly. ····· 2
C. Poor sensitivity of meter (the meter does not indicate the variations equivalent to the varying aperture figure, ASA number, brightness, etc.) ····· 2
D. AUTO Snap Shot ····· 3
(Snap shot implies that the shutter curtain does not open while the mirror remains lifted up.)
E. Manual Snap Shot ····· 5
F. AUTO Release ····· 5
(Release implies that the shutter curtain opens for 10 seconds or more after a shutter release.)
G. Manual Release ····· 7
H. Defective Work of Meter (the pointer does not move; unstable, slow in response, shaken off) ····· 7
I. Battery checker do not light up or turn off. ····· 7

■How to Short-Circuit SW 5



As SW5 is turned ON during shutter release only, short-circuiting it may sometimes be convenient in tracing the causes of trouble. On this occasion, use the lead wire as indicated in the drawing.

※Incidentally, use the constant-current power source as short-circuit of SW5 consumes 13～15mA current at all times.

■Voltege at Electric Circuits of Principal Check Position

Voltage Check Position	Before Shutter Release	During Exposure	After Exposure	Remarks
SW1± SW3+ C_2+ SW_5+	3.0V	3.0V	3.0V	Voltage falls scmewhat during exposure while the batteries are in use.
C_1+SW2′	Tv 4 550～590mV Mean value≃570mV	Tv 4 550～590mV	Tv 4 550～590mV	Some variations occur depending on light quantity.
R_{12}+ SW5−	0 V	3.0V	0 V	Voltage falls somewhat during exposure while the batteries are in use.
C_1− C_3−	0 V	0 V	0 V	
C_2− SW3−	3.0V	At AUTO exposure 3.0→2.5→0V At manual exposure 3.0→1.6→0V	3.0V	The instantaneous 0V display cannot be judged by the digital tester.
C_3+ R_{12}−	0 V	0→1.7～2.5V	0 V	When SW5 is ON, 0≃0.02V
R_{10} com (Trigger level)	0 V	At AUTO exposure ≃2.5V At manual exposure ≃1.6V	0 V	
Mg−	0 V	0→0.08→ ≃3.0V or less	0 V	When the magnet turns off, the counter current becomes about 20V momentarily.
Rsv	Av 6 / Sv 5 } 120～150mV Mean value≃134mV	120～150mV	120～150mV	Release photometering with some variations in temperature.
Me+	4S−19mV 1/15S−65mV 1/1000S−135mV	Falls somewhat	4S−19mV 1/15S−65mV 1/1000S−135mV	Within the photometering range
Current Consumption	≃125～200μA	≃15mA	≃125～220μA	

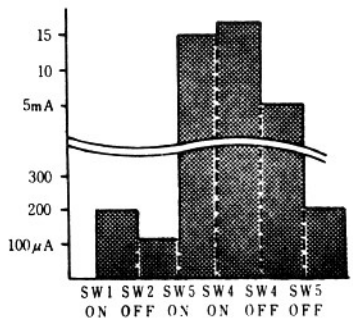
A. At both Automatic and manual shap shot, shutter speed variations occur at high speed shutter release (1/1000S, 1/500S)

- Check on chattering of SW4 and SW5
  - Check on contact resistance of SW4 and SW4' → Remove the lead wire of SW4 (+) and measure it under B exposure state. SW4 chattering within 100μS is ideal. (Measure it with an oscilloscope.) Contact resistance must be 300m or below including that of switches and lead wires.
  - Measurement of CR time
- Visual check on C_3 (+)
  - → Defective contact of R_{12}
  - → Defective soldering of condenser C_3 (unadjustable)
- Visual check on condenser C_4 → Defective soldering ot condenser C_4
- Check on shutter block → Connect the standard circuit for check.

B. Batteries becomes dead quickly.

Set the power source adaptor to the battery box to read the variations of current consumption

Photometering state (SW1, ON) ≃ 125 ~ 220μA
Exposung state (SW5, ON) ≃ 15mA
When SW1 is OFF ≃ 0μA



- Visual check on circuit base plates A and B.
  - → Shortcircuit in top cover of SW1
  - → Shortcircuit between soldered parts
  - → Shortcircuit between lead wires
  - → Shortcircuit with solder sludge
- Check on battery case → Short circuit in battery case or power source high-current ≃ few 100mA
- Check on SW1, SW4' and SW5 → When SW1 is ON: ≃ 125μA; When SW4 is ON: ≃ few 100μA ~ few mA; When SW5 is ON: ≃ 15mA

C. Power Sensitivity of Meter (the meter does not indicate the variations equivalent to the varying aperture figure, ASA number, brightness etc.)

- Vary the aperture figure.
  - Check on the conduction slide resistor → Skipping (the orbit of contact changes.)
  - Check on memory voltage variations at C_1 (+) (18mV/1Av)
  - ※ Readjustment of R_1 and R_2
- Vary the ASA number
  - Check on the conduction slide resistor. → Skipping (the orbit of contact changes.)
  - Check on memory voltage variations at C_1 (+) unit (18mV/1 Sv)
- Vary the brightness value.
  - Check on CdS, Rp resistance and soldering.
  - ※ Readjustment of automatic shutter release

D. Automatic Snap Shot

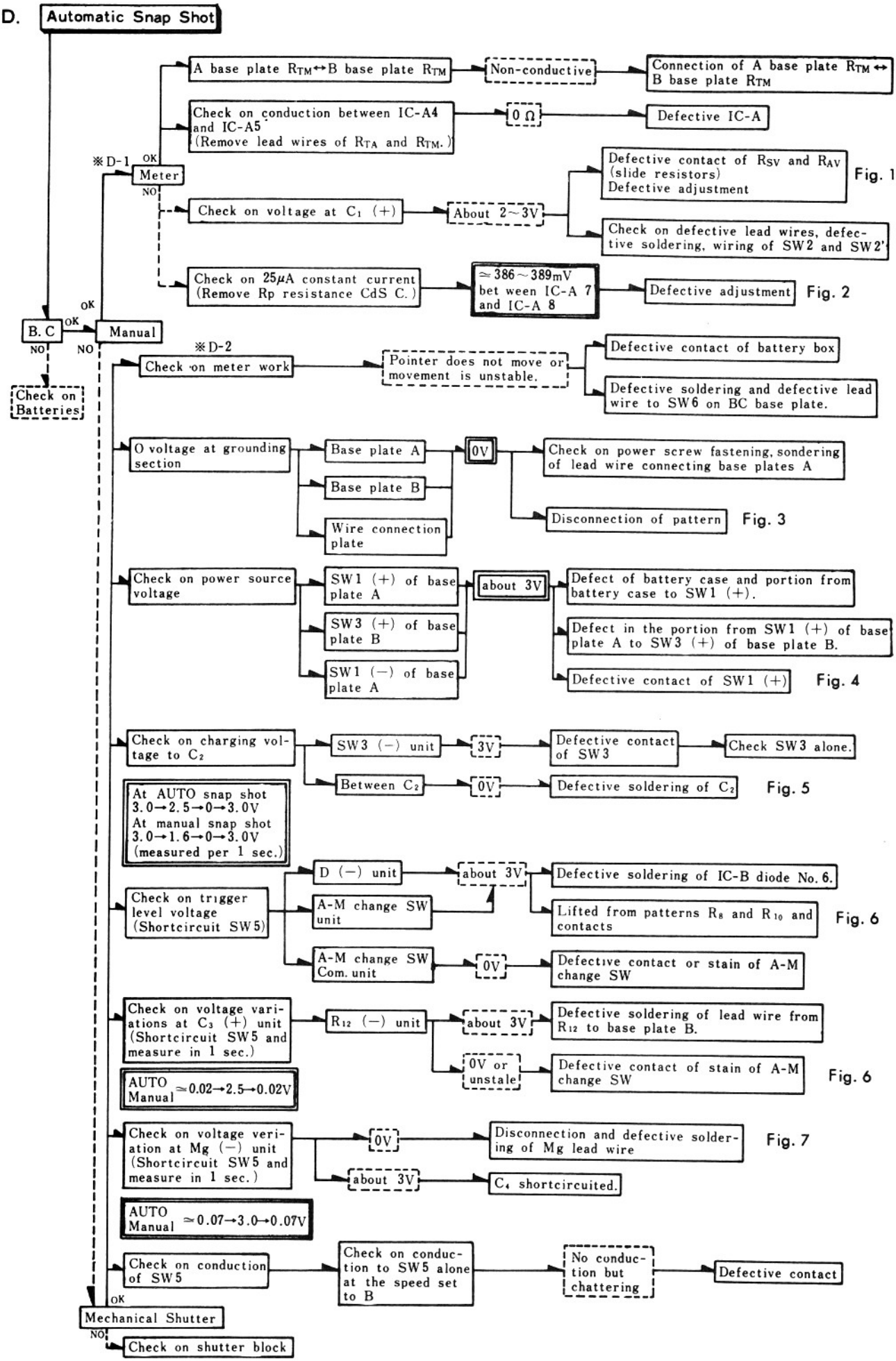

A base plate R_{TM}↔B base plate R_{TM}
Non-conductive
Connection of A base plate R_{TM} ↔ B base plate R_{TM}
Check on conduction between IC-A4 and IC-A5 (Remove lead wires of R_{TA} and R_{TM}.)
0 Ω
Defective IC-A
※D-1
OK
Meter
NO
Defective contact of R_{SV} and R_{AV} (slide resistors) Defective adjustment
Fig. 1
Check on voltage at C_1 (+)
About 2~3V
Check on defective lead wires, defective soldering, wiring of SW2 and SW2'
Check on 25μA constant current (Remove Rp resistance CdS C.)
≃386~389mV bet ween IC-A 7 and IC-A 8
Defective adjustment
Fig. 2
OK
B. C
OK
Manual
NO
NO
※D-2
Check on meter work
Pointer does not move or movement is unstable.
Defective contact of battery box
Defective soldering and defective lead wire to SW6 on BC base plate.
Check on Batteries
O voltage at grounding section
Base plate A
Base plate B
Wire connection plate
0V
Check on power screw fastening, sondering of lead wire connecting base plates A
Disconnection of pattern
Fig. 3
Check on power source voltage
SW1 (+) of base plate A
SW3 (+) of base plate B
SW1 (−) of base plate A
about 3V
Defect of battery case and portion from battery case to SW1 (+).
Defect in the portion from SW1 (+) of base plate A to SW3 (+) of base plate B.
Defective contact of SW1 (+)
Fig. 4
Check on charging voltage to C_2
SW3 (−) unit
3V
Defective contact of SW3
Check SW3 alone.
Between C_2
0V
Defective soldering of C_2
Fig. 5
At AUTO snap shot 3.0→2.5→0→3.0V
At manual snap shot 3.0→1.6→0→3.0V
(measured per 1 sec.)
Check on trigger level voltage (Shortcircuit SW5)
D (−) unit
A-M change SW unit
A-M change SW Com. unit
about 3V
0V
Defective soldering of IC-B diode No. 6.
Lifted from patterns R_8 and R_{10} and contacts
Defective contact or stain of A-M change SW
Fig. 6
Check on voltage variations at C_3 (+) unit (Shortcircuit SW5 and measure in 1 sec.)
AUTO Manual ≃0.02→2.5→0.02V
R_{12} (−) unit
about 3V
0V or unstale
Defective soldering of lead wire from R_{12} to base plate B.
Defective contact of stain of A-M change SW
Fig. 6
Check on voltage veriation at Mg (−) unit (Shortcircuit SW5 and measure in 1 sec.)
AUTO Manual ≃0.07→3.0→0.07V
0V
about 3V
Disconnection and defective soldering of Mg lead wire
C_4 shortcircuited.
Fig. 7
Check on conduction of SW5
Check on conduction to SW5 alone at the speed set to B
No conduction but chattering
Defective contact
OK
Mechanical Shutter
NO
Check on shutter block

Fig-1

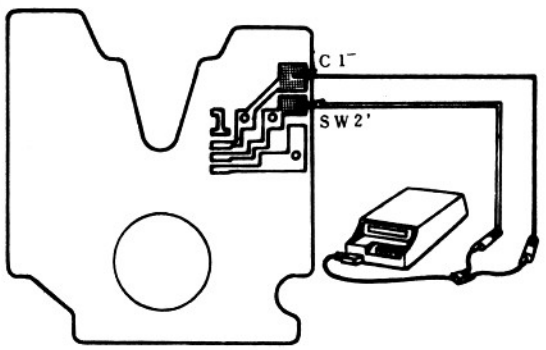


Fig-2

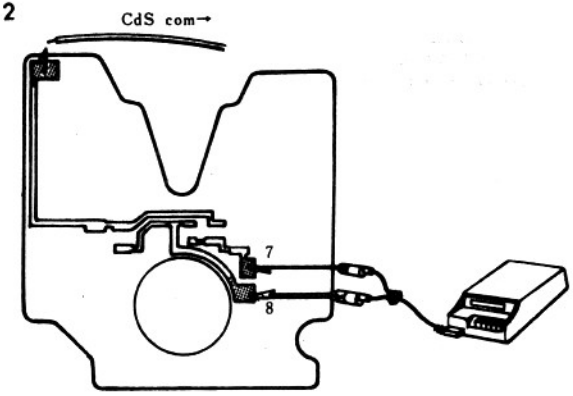


Fig-3

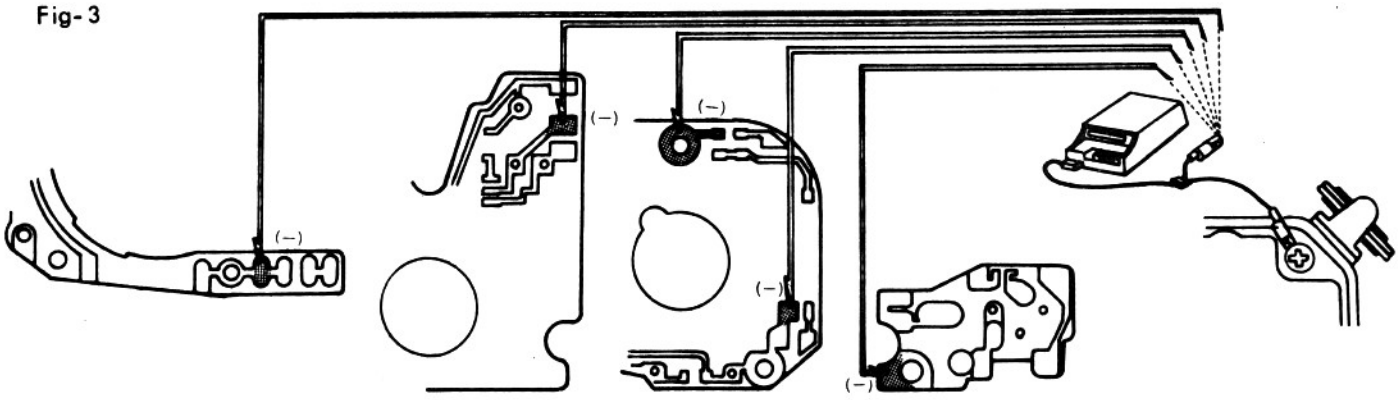


Fig-4

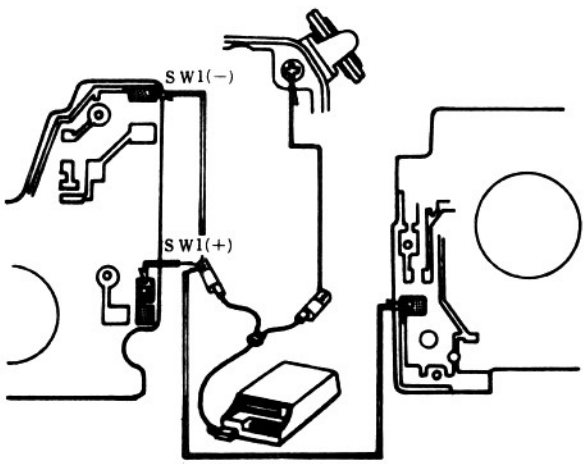


Fig-5

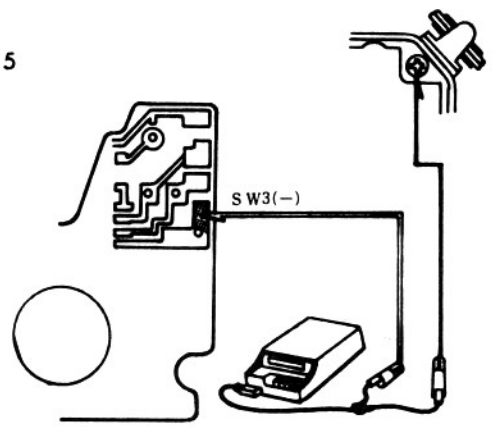


Fig-6

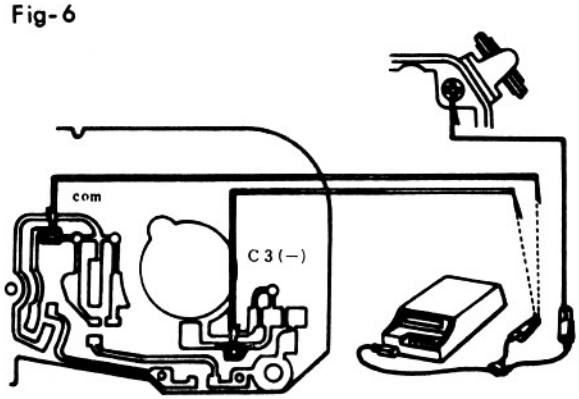
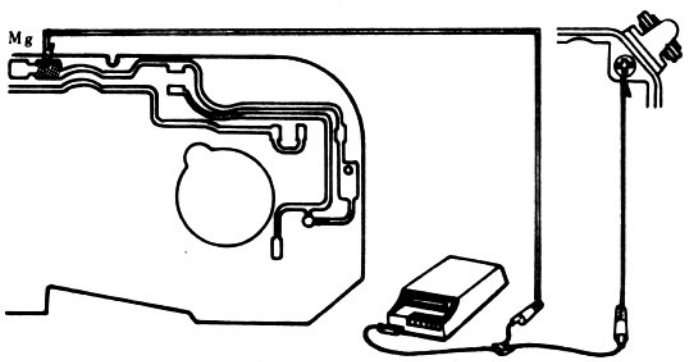


Fig-7



E Manual Snap Shot

- Check R_T resistance → ∞ or 0Ω → Defective tip resistance → Replace Base Plate B
- ∞ or 0Ω → Contact with solder of SW4 (+) unit and other patterns — Fig. 8
- Check on trigger level voltage (SW5 shortcircuited com terminal of base plate B, Manual≃1.6V) → about 3.0V → Defective semi-fixed resistance of R_{10} and defective soldering on R_{11} side — Fig. 9
- B.C OK → Auto OK
- B.C NO → Check on batteries
- Auto NO → ※ Same as D-2
- Auto NO → Mechanical shutter → Check on shutter block

F Automatic Release

- Check on exposure change slide switch (Set the shutter dial to Auto position) → No conduction between SW_4 (+) and R_T → Defective contact of slide SW — Fig. 10
- R_{TA} unit of base plate A → No conduction → Disconnection of connecting lead wire from R_{TA} unit of base plate B
- Check conduction to A-M change SW (detach com lead wire.) → No conduction between com and A → Defective contact of A-M change SW
- Check on voltage at C (+) (Normal memory voltage is indicated.) → 0V → Defective contact of SW2 and SW2'; defective condenser C_1
- Check on voltage at C (+) (Normal memory voltage is indicated.) → 3.0V at release → Defective solder of C_1, SW2 and SW3 are shortcircuited. — Fig. 11
- Check on conduction to SW3 → Over 3.0V at SW3 (−) unit → SW3 is shortcircuited — Fig. 12
- Meter OK
- Meter NO → SW1 (−) unit of base plate A → 0V → Defective contact of SW1 / Defective soldering of lead wire; SW1 contacts the body. / Disconnection of lead wire — Fig. 13
- Meter NO → Check on CdS wiring → Visually → Defective soldering of CdS or Rp resistor; broken leg of CdS.
- B.C OK → Manual OK
- B.C NO → Check on batteries
- Manual NO → Check on conduction to A-M change SW (Remove com lead wire of base plate B.) → No conduction between com and A → Defective contact of A-M change SW — Fig. 14
- Manual NO → Check on exposure change slide switch → R_{TM} / SW4 (+) → R_{TA} → No conduction → Defective contact of exposure change slide switch
- Manual NO → Check on SW4 or conduction in SW4 (Remove lead wire of SW4.) → No conduction → Defective contact; disconnection of lead wire.
- Manual NO → Check on charging voltage variations at C_2 (−) unit → No less than 3.0V → SW3 is shortcircuited. / Defective C_2 — Fig. 15 / Defective contact of SW4 and SW4'
- Manual NO → Check on power source voltage
- Manual OK → ※ F-2 → Mechanical shutter
- Mechanical shutter NO → Check on shutter block

Fig-8

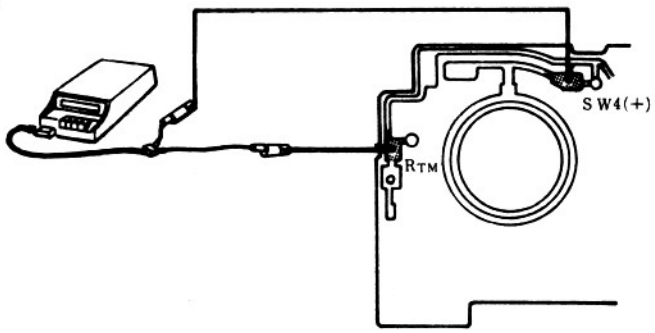


Fig-9

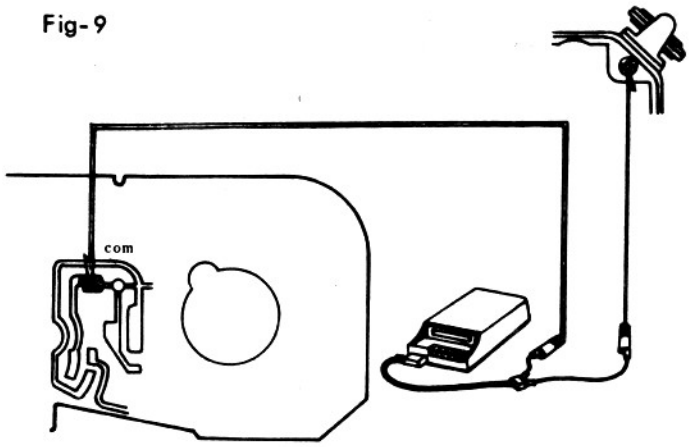


Fig-10

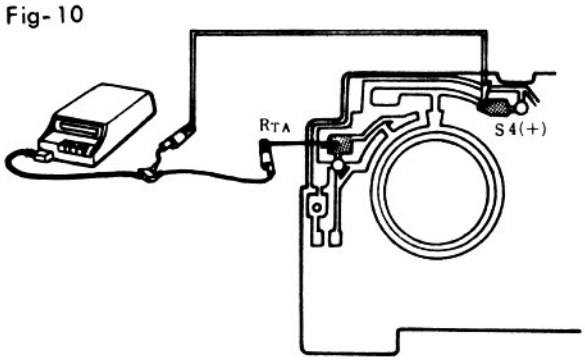


Fig-11

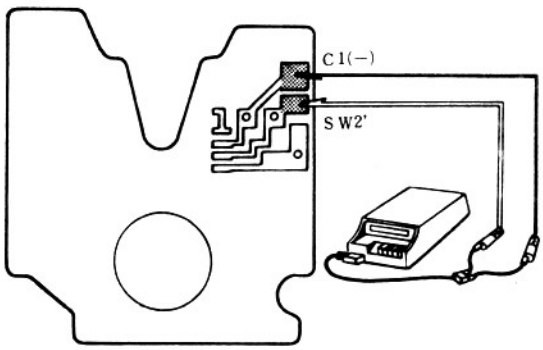


Fig-12

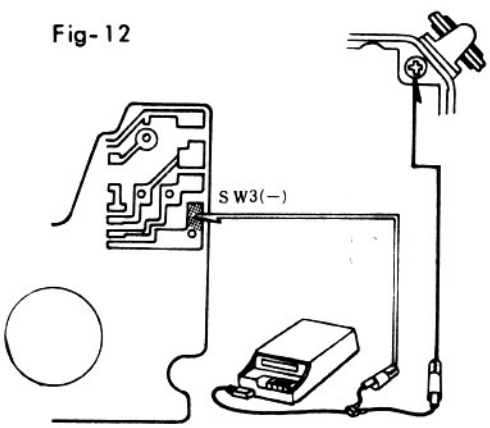


Fig-13

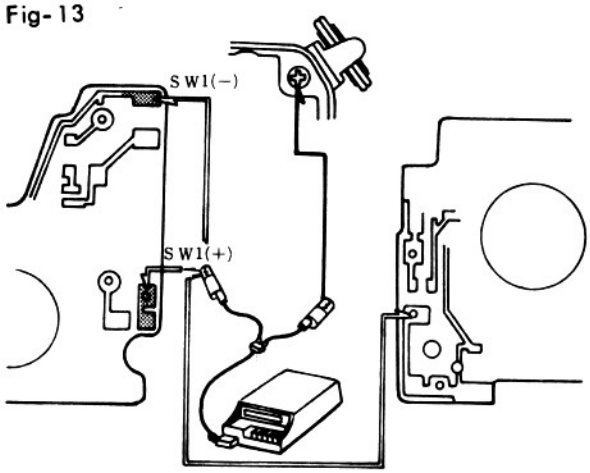


Fig-14

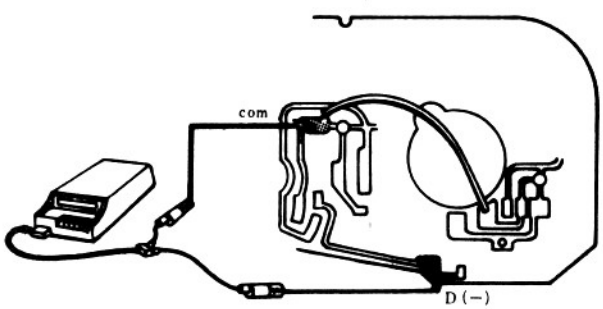
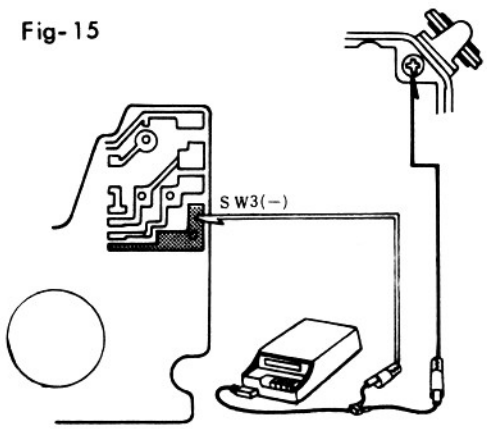
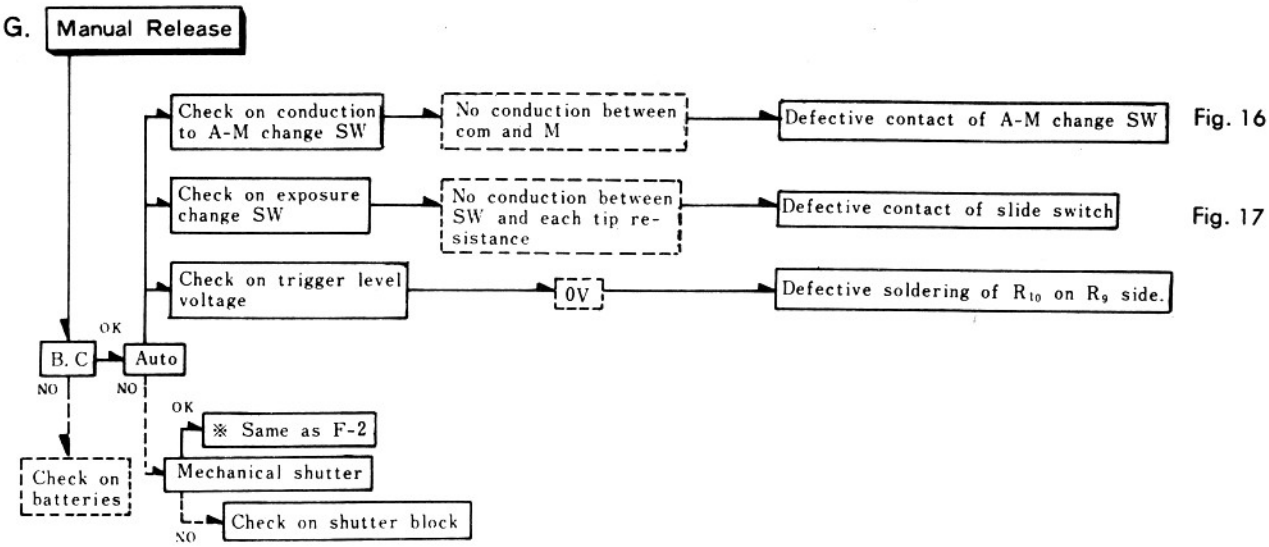


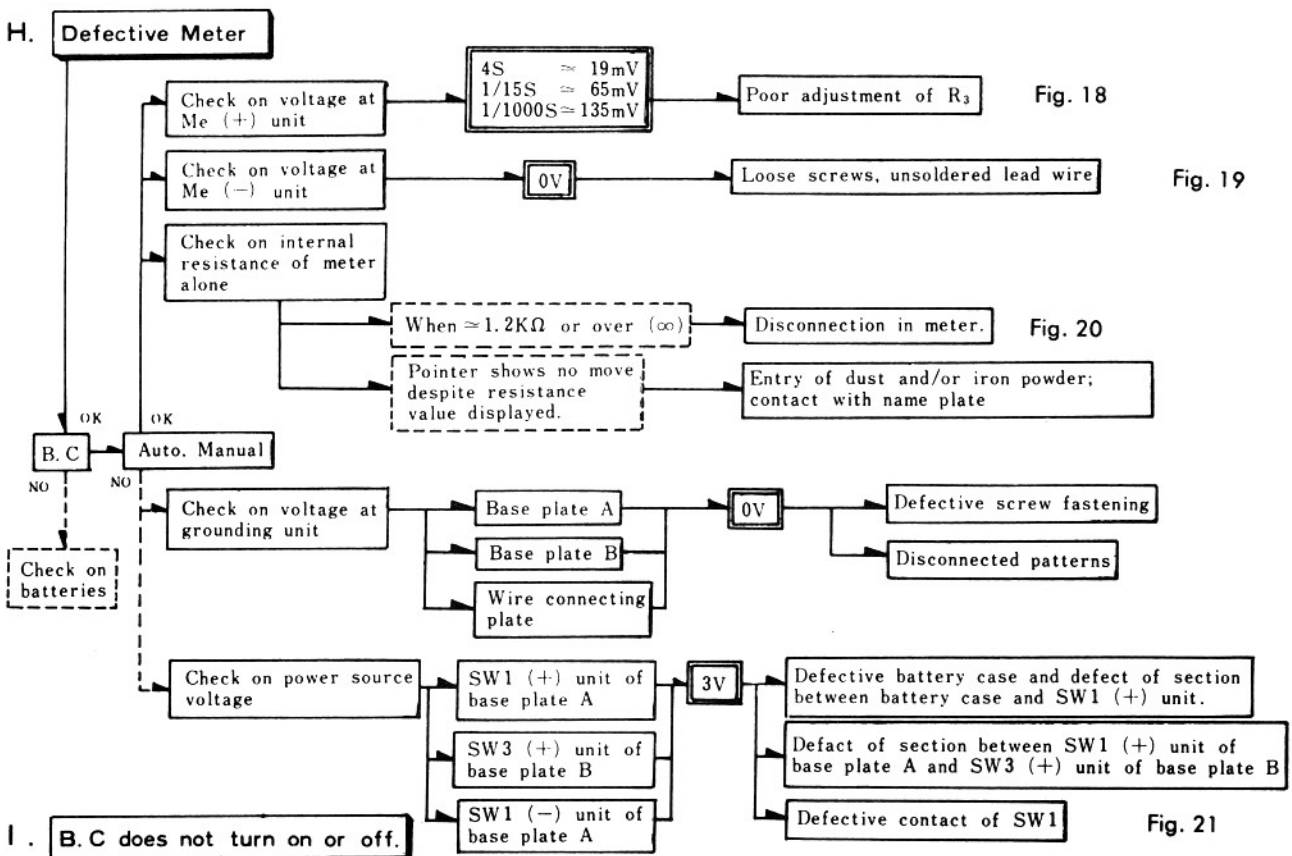
Fig-15



G. Manual Release



H. Defective Meter


Check on voltage at Me (+) unit
4S ≃ 19mV
1/15S ≃ 65mV
1/1000S ≃ 135mV
Poor adjustment of R3
Fig. 18
Check on voltage at Me (−) unit
0V
Loose screws, unsoldered lead wire
Fig. 19
Check on internal resistance of meter alone
When ≃1.2KΩ or over (∞)
Disconnection in meter.
Fig. 20
Pointer shows no move despite resistance value displayed.
Entry of dust and/or iron powder; contact with name plate
OK
OK
B. C
Auto. Manual
NO
NO
Check on batteries
Check on voltage at grounding unit
Base plate A
Base plate B
Wire connecting plate
0V
Defective screw fastening
Disconnected patterns
Check on power source voltage
SW1 (+) unit of base plate A
SW3 (+) unit of base plate B
SW1 (−) unit of base plate A
3V
Defective battery case and defect of section between battery case and SW1 (+) unit.
Defact of section between SW1 (+) unit of base plate A and SW3 (+) unit of base plate B
Defective contact of SW1
Fig. 21

I. B.C does not turn on or off.

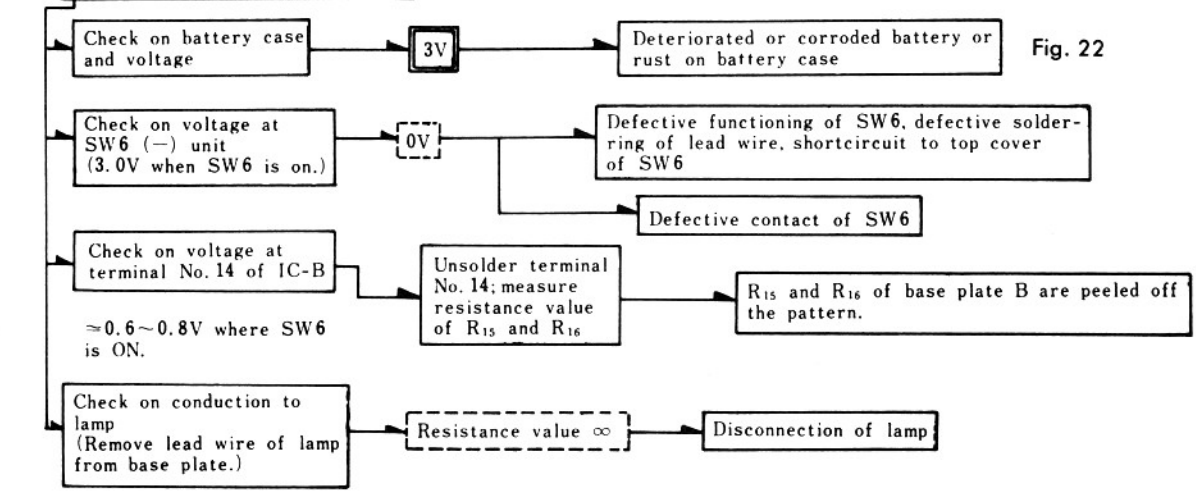

Check on battery case and voltage
3V
Deteriorated or corroded battery or rust on battery case
Fig. 22
Check on voltage at SW6 (−) unit (3.0V when SW6 is on.)
0V
Defective functioning of SW6, defective soldering of lead wire, shortcircuit to top cover of SW6
Defective contact of SW6
Check on voltage at terminal No. 14 of IC-B
≃0.6~0.8V where SW6 is ON.
Unsolder terminal No. 14; measure resistance value of R15 and R16
R15 and R16 of base plate B are peeled off the pattern.
Check on conduction to lamp (Remove lead wire of lamp from base plate.)
Resistance value ∞
Disconnection of lamp

Fig-16

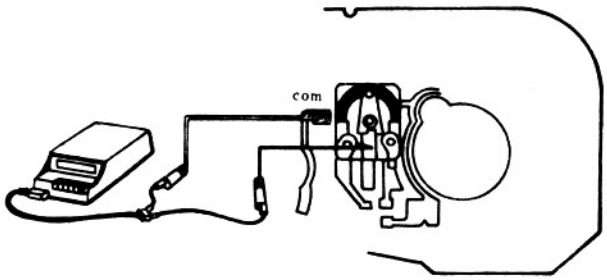


Fig-17

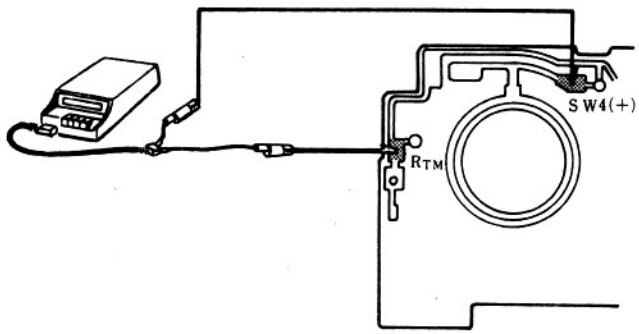


Fig-18

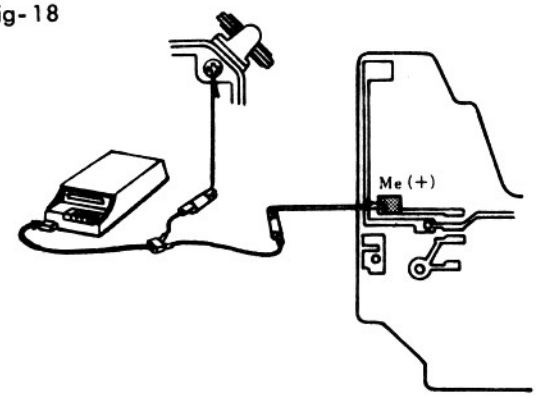


Fig-19

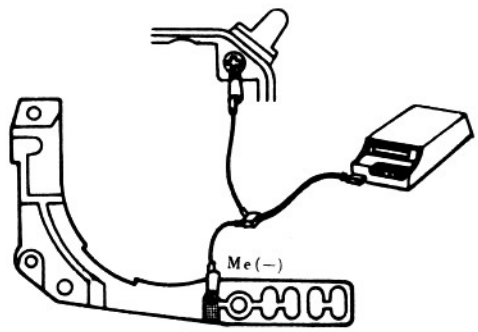


Fig-20

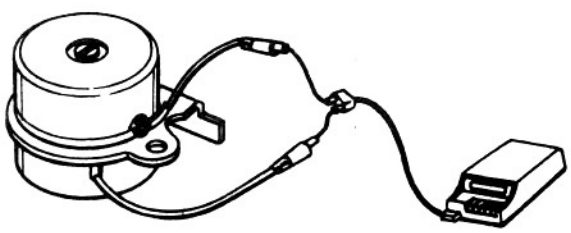


Fig-21

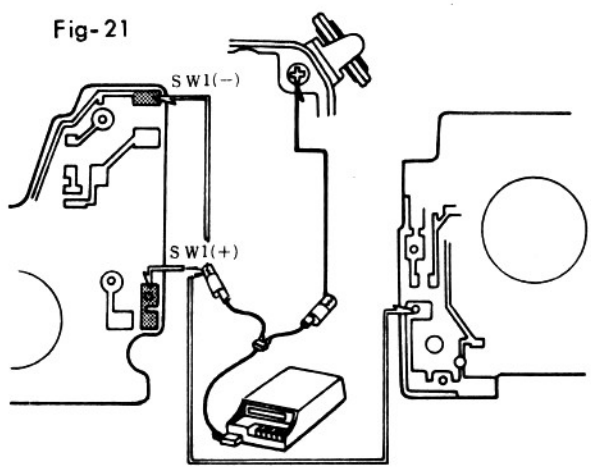
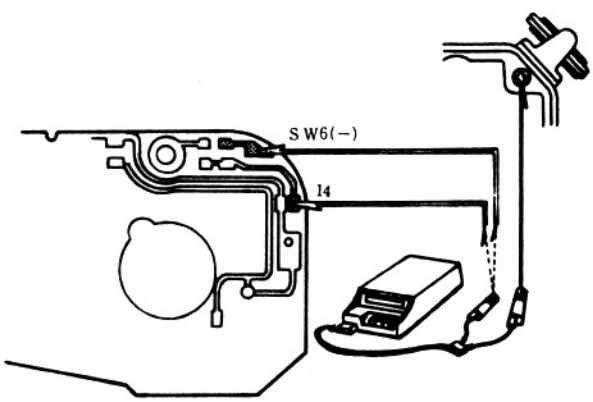


Fig-22



1. How to Confirm Manual Time

■Measuring Instruments

: 081 Standard Circuit Tester 〈Model SC-I〉
: Digital Time Counter 〈Model TC-I〉
: Shutter Tester

■Standard Value

Set Position of "SS SEL" of 081 Standard Circuit Tester	Indication of Shutter Tester		CR Time
	Standard Figure	Allowed Figure	
1/1	1000ms	758～1320ms (±0.4Ev)	1 sec.
1/4	250ms	189～330ms (±0.4Ev)	251ms
1/1000	0.98ms	0.563～1.71ms (±0.8Ev)	2 ms

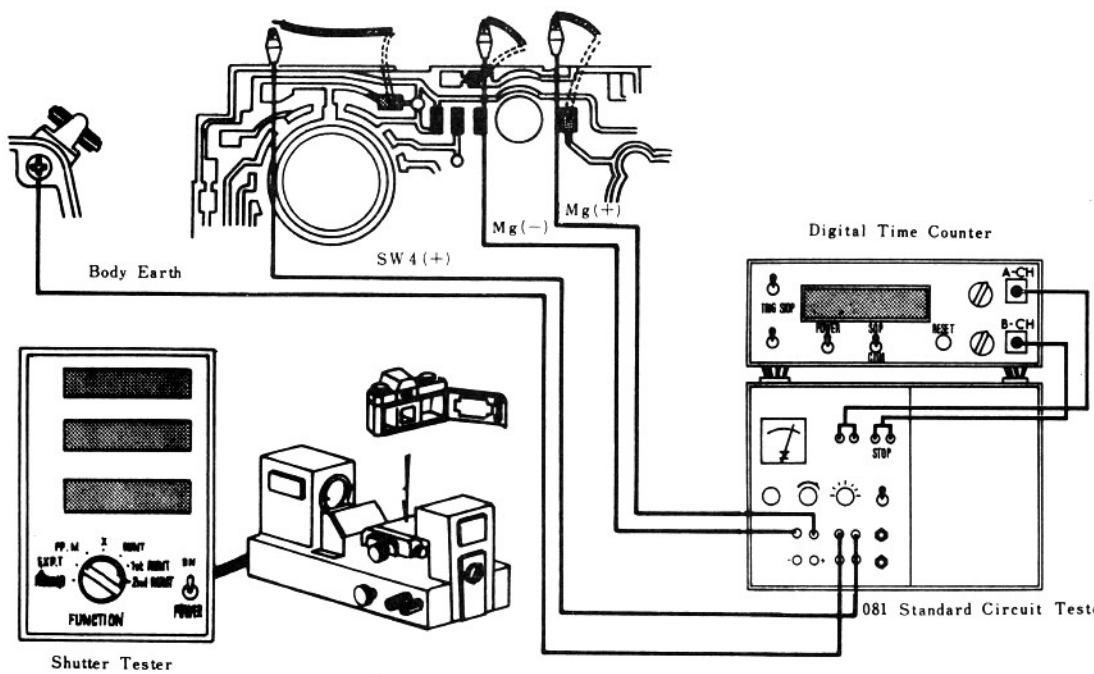
■How to Confirm

1. Unsolder the lead wires of SW4 (+side) and Mg (+and−sides) of circuit base plate plate B (0602) and set them to the tester as shown in the follwing diagram.

- **Digital Time Counter**
  SEP-COM SW: SP
  Trigger Level A-CH: +1 (V)
  B-CH: +1 (V)
  Trigger Slope A-CH: +
  B-CH: +

- **Shutter Tester**
  Curtain Running Direction: DOWN
  FUNCTION: EXP-T

- **081 Standard Circuit Tester**
  SS SEL: 1, 1/4, 1/1000
  V SEL: 3.0 V



2. Select a shutter speed by the "SS SEL" dial of the 081 standard circuit tester. Press the "RESET" SW of the 081 standard circuit tester, release the shutter, and Confirm that the measured figure of 1/1, 1/4 and 1/1000 remains within the range of the rated figures.

3. If the measured figures of 1/1, 1/4 and 1/1000 don't remain within the range of the rated figures, check the shutter block.

2. How to Confirm Chattering of SW4

■Measuring Instruments

: 081 Standard Circuit Tester (Model SC-I)
: Digital Time Counter (Model TC-I)

■Standard Value

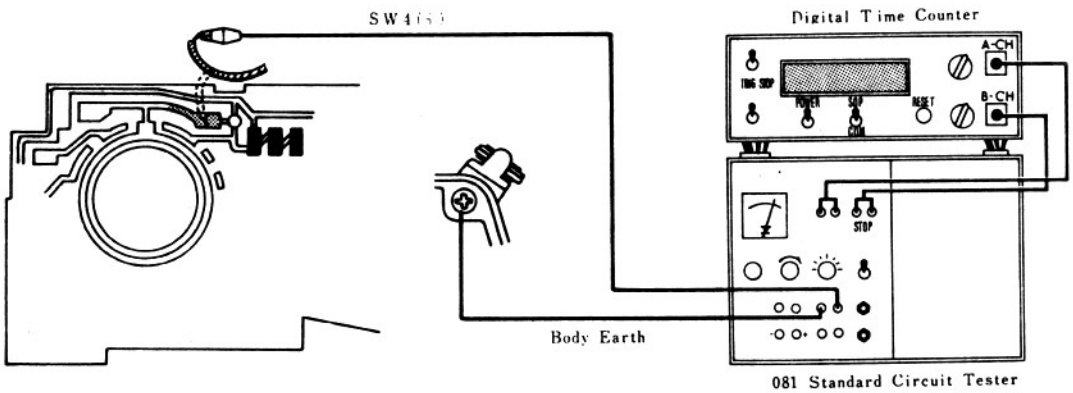
1/1000	1.0±0.05ms
1/60	15±0.2ms

■How to Confirm

1. Unsolder the lead wire of SW4 (+side) of the circuit base plate B (0602) and set it to the tester as shown in the following diagram.

- **Digital Time Counter**
  SEP-COM SW : SEP
  Trigger Level A-CH : +1 (V)
  B-CH : +1 (V)
  Trigger Slope A-CH : +
  B-CH : −

- **081 Standard Circuit Tester**
  SS SEL : S4 CAL
  S4 SW : 1/60. 1/1000

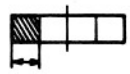


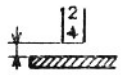
2. Set "S4 SW" of the 081 standrad circuit tester to 1/1000 and 1/60, press the "RESET SE" release the shutter, and confirm that the measured figures of 1/1000 and 1/60 remain within the range of the rated figures.

3. If the measured figures of 1/1000 and. 1/60 don't remain within the range of the rated figures, check the shutter block.

INSPECTION STANDARDS

■The inspection standards provided for hereinunder shall be applied to the inspection made by the Service divisions on the repaired cameras but shall be inapplicable to the new cameras inspected at delivery or arrival. The appearance of such cameras shall be inspected based on its appearance at the time of the repairs being requested therefor as the standards. Follow the following standards for the replacement parts therefor.

Item	Place	Contents	How to confirm and adjust (Pages referring to disassembling, assembling and adjusting)
Film Advance	Film advance lever	Unsmooth film advance, vertical looseness, backlash, abnormal noise, winding torgue of 4kg/cm or below (without film)	P. 7
	Spool	Operation: Unsmooth; whether film is correctly wound; slip load 200～300g	P. 1～2
	Sprocket	Operation: Slipping, backlash after film winding, slipping after pressing the rewinding button.	P. 1～4
Film Rewinding	Film rewinding button	Operation: Shearing, release, hold.	P. 3～4
	Film rewinding crank	Operation: Eccentricity, creak, roughness, ineffective SP	P. 32～33
Film Counter	Forward and backward feed	Operation: No advance, standstill, skipping, no backward move, hold, scale deviation.	P. 10
Film Signal	Forward and backward feed	Operation: Whether a signal is provided at the initial frame indicated by the counter, as shown in the drawing. The signal does not disappear at 36+3 frames. 	P. 10
Multiple Exposure	Multiple exposure lever	Functionining: Returns after film has been wound until it clicks. Spool and sprocket run idle after the lever is set.	P. 11
Shutter	Shutter button	Shutter load: 200～400g. Operation is unsmooth; shock.	P. 9
	Functions of curtain	Abnormal noise, thrust; curtain overlapping.	P. 13
	Shutter speed	Allowance: refer to P.3. Irregular exposure: within 0.4EV.	P. 38～46
	Shutter speed dial	Functioning: Unsmooth; clicks; auto-lock; deviation of scales. (The center of a letter must come to the index.)	P. 33
	Self-timer	Set lever: Deviated position; defective setting; shutter release; rubbing with button. The lever must work correctly on the position marked in the left drawing Functioning: irregular and unsteady work; 2-stage release; does not work.	P. 30
	Synchro	Conductivity: Whether it may unfailingly ignite; whether any short-circuit in winding film; accessory shoe can be conductive. Functioning: X-FP synchro selector switch.	P. 39
		Insulation registance: 10MΩ or more (DC 250V Insulation resistance gauge is used.)	
		Delay time: FP contact 11～15ms (at $\frac{1}{1000S}$) X contact A lag 0.4ms or over (for X) B lag 2.0ms or over	
		Contact efficiency: FP contact 60% (measured on a measuring time of 2.5ms and 1/1000s.) X contact 50% (measured on a measuring time of 1 ms X.)	

Item	Place	Contents	How to confirm and adjust (Pages referring to disassembling, assembling and adjusting)
Finder	Nominal view	Inclination of image-1° or below. ∞ coincidence; fuzzy on one side; fog; rubbing the mask.	P. 35
	Display	The shutter speed and aperture are displayed in the frame with no adjacent letter seen therein; digital scale flaw dust, stains,	P. 36
Mirror	Angle	Stop position: 45° ± 30° Rising position: The mirror must be behind the flare shield plate.	P. 28
Back Cover	Operation	The back cover automatically lifts up when the rewinding knob is pulled up. It closes securely with no looseness.	P. 12
	Press board	Flatness: 0~0.02mm (concave)	
Exposure meter	Pointer	Functioning: Hold, deviation, sticking. 0 Position The pointer must be inside for meter needle of the width over the mark. 	P. 47
	Index difference	ASA 100EV 5 F 5.6 1 sec. 9 F 4 1/30 sec. 11 F 4 1/125 sec. Allowance ±0.7EV 15 F 5.6 1/1000 sec.	
	Exposure error	(ASA aperture value is the same as the index error at the same measuring point.) Allowance: ±0.8EV, Variation range: 0.6EV	P. 37~47
	Power switch	ON-OFF operation Shutter button lock when the switch is off.	P. 16
	Diaphragm button	The meter is on when the diaphragm button is released or set. Functioning: unsmooth; engaging condition.	P. 20
	ASA change ring	Functioning: engaging condition, index deviation. ASA 25~800 transfer error ±0.3EV Other error ±0.5EV	P. 37
	Exposure correction ring	Functioning: Click, index deviation.	P. 33
Focus		Body back: $43.70^{+0.02}_{-0}$ (until pressure plate face) Finder back: 43.575±0.025	P. 34
Lens	Helicoid	Functioning: Unevenness, crack, looseness, and loaded. Scale deviation: The index center is indicated within ½ of the width of letter.	——
	Diaphragm	Functioning: Whether it smoothly functions from release to F 16. Whether any residual impellers, decentering, deformation, etc. are found.	——
Others	Eye-piece shutter lever	Functioning: looseness, click and clearance.	P. 32
	Attaching and detaching lens	Functioning: Whether said processes feel heavy or light, whether lock is unworkable or loose, etc.	P. 24
	Battery box	Contact of battery and corrosion of the contact pieces, etc.	P. 13

Standard Values of Shutter Speed (±0.5EV)

Standard \ Shutter Speed	4 sec	2	1	1/2	1/4	1/8	1/15	1/30	1/60	1/125	1/250	1/500	1/1000
Standard Values	4.00s	2.00s	1.00s	500ms	250ms	125ms	62.5ms	31.3ms	15.6ms	7.81ms	3.91ms	1.95ms	0.977ms
Maximum Limit Value	5.66s	2.83s	1.41s	707ms	354ms	177ms	88.4ms	44.3ms	22.1ms	11.0ms	5.53ms	2.76ms	1.38ms
Minimum Limit Value	2.83s	1.41s	707ms	354ms	177ms	88.4ms	44.3ms	22.1ms	11.0ms	5.53ms	2.76ms	1.38ms	0.691ms

Irregular Exposure Based on Shutter Speed

The exposure time in A-Range and C-Range on both sides of B-range (center) remains within ±0.3 EV ($^{+23\%}_{-19\%}$) The maximum and minimum values of the respective ranges shall be within 0.4EV ($^{+32\%}_{-25\%}$)

(1) In the case of mid-expanding trend

($^{\text{A Range}}_{\text{or C Range}}$ − B Range) ÷ B Range × 100 = within ($^{+23\%}_{-19\%}$)

(2) In case of end-narrowing or endexpanding trend

(Min. value − Max. value) ÷ Max. value × 100 = −25%

(Max. value − Min. value) ÷ Min. value × 100 = +32%

〔Example〕

Where A range = 0.80ms, B range = 1.00ms and C Range = 0.70ms,

(0.70 − 1.00) ÷ 1.00 × 100 = −30%

This value is out of the standards.

ANNEXED DATA (How to Obtain $R_P \cdot V_{BV0} \cdot V_{BV10}$)

1. How to Obtain Said Data by Calculating Expressions

R_P, V_{BV0} and V_{BV10} will be obtained through the application of R_{LLBV0}, R_{LLBV5} and R_{HHBV5} obtained from the "measurement of CdS resistance value" as described in Item C of Auto-Exposure Control.

$$\gamma = \frac{R_{LLBV0}}{R_{LLBV5}} \cdots\cdots (1) \qquad \alpha = \frac{R_{HHBV5}}{R_{LLBV5}} \cdots\cdots (2)$$

The values calculated in the expressions (1) and (2) shall be within ranges of $\gamma = 5.5 \sim 8.5$, $\alpha = 8 \sim 12$.

$$R_P = (5.432 + 0.0638 \times \gamma) \times \left(\frac{\alpha}{1+\alpha}\right)^2 \times R_{LLBV5} - \left\{11 \times (8.5 - \gamma) \times \frac{R_{LLBV5} - 8}{22}\right\} \cdots\cdots (3)$$

$$V_{BV5} = \frac{755.8}{\gamma} + 4.32 \times \alpha - 336.2 \cdots\cdots (4)$$

$V_{BV0} = V_{BV5} - 91 \cdots\cdots$ (5) **Note:** In relation to temperature correction, the calculated value (−) will be replaced with (+) value.

$V_{BV10} = V_{BV5} + 92 \cdots\cdots$ (6) **Note:** In relation to temperature correction, the calculated value (+) will be replaced with (−) value.

Note: The numeral 91 or 92 in the expression (5) or (6) is a value obtained from the measurement made at the ambient temperature of 25°±2.5°C, and it must be corrected when obtained by the measurement performed at the ambient temperature out of 25°±2.5°C.

2. How to Obtain Said Data from Numerical Chart

To obtain R_P, V_{BV0}, and V_{BV10}, look for R_{LLBV0}, R_{LLBV5} and R_{HHBV5} obtained by the "measurement of CdS resistance value" as described in Item C of Auto-Exposure Control, in said order.

① Count fractions over 0.5 as one and disregard the rest of the decimals of R_{LLBV5} and open the page where said value is contained.

② Select the column containing the value or an approximate value of R_{HHBV5} on the page stating the value of R_{LLBV5}.

③ Select the line containing the value or an approximate value of R_{LLBV0} in the column stating the value or an approximate value of R_{HHBV5}.

④ R_P, V_{BV0} and V_{BV10} in the line containing the value or an approximate value of R_{LLBV0} are the values required to be obtained.

(Example) Where R_{LLBV0}: 185KΩ, R_{LLBV5}: 25.5KΩ and R_{HHBV5}: 245KΩ.

① R_{LLBV5}: 25.5KΩ will be 26KΩ through counting fractions over 0.5 as one and disregarding the rest tnereof; then open Page. 4.

② Since R_{HHBV5}: 245KΩ is not found in any column on Page 4, apply the column stating an approximate value of 247KΩ.

③ Since no line containing R_{LLBV0}: 185KΩ exists in the column mentioning an approximately value of 245KΩ of R_{HHBV5}, apply the line containing 182KΩ.

④ R_P: 112KΩ, V_{BV0}: 278mV, and V_{BV10}: 95mV are obtained from the line containing the approximate value of 182KΩ of R_{LLBV0}.

Note: Select the expressions or numerical chart to obtain R_P, V_{BV0} and V_{BV10}.

R_{LLBV5} = 16[KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
192	136	81	286	103	168	136	80	293	110	144	136	77	299	116
	128	79	281	98		128	77	287	104		128	75	294	111
	120	77	275	92		120	75	281	98		120	73	288	105
	112	74	267	84		112	72	274	91		112	70	280	97
	104	72	259	76		107	71	269	86		104	68	272	89
	96	69	249	66		96	68	256	73		96	65	262	79
	88	67	238	55		88	65	244	61		88	63	251	68
184	136	81	289	106	160	136	79	295	112	136	136	77	301	118
	128	78	283	100		128	77	290	107		128	74	296	113
	120	76	277	94		120	74	283	100		120	72	290	107
	112	74	270	87		112	72	276	93		117	69	283	100
	104	71	261	78		104	69	267	84		104	67	275	92
	96	69	252	69		96	67	258	75		96	64	265	82
	88	66	240	57		88	64	247	64		88	62	253	70
176	136	80	291	108	152	136	78	297	114	128	136	75	304	121
	128	78	285	102		128	76	292	109		128	73	298	115
	120	75	279	96		120	73	285	102		120	71	292	109
	112	73	272	89		112	71	278	95		112	68	285	102
	104	71	263	80		104	69	270	87		104	66	277	94
	96	68	254	71		96	66	260	77		96	64	267	84
	88	66	242	59		88	64	249	66		88	61	256	73

R_{LLBV5} = 17[KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
204	145	87	286	103	179	145	85	293	110	153	145	82	299	116
	136	84	281	98		136	82	287	104		136	80	294	111
	128	81	275	92		128	79	281	98		128	77	288	105
	119	78	267	84		119	77	274	91		119	74	280	97
	111	76	259	76		111	74	266	83		111	72	272	89
	102	73	249	66		102	71	256	73		102	69	262	79
	94	70	238	55		94	68	244	61		94	66	251	68
196	145	86	289	106	170	145	84	295	112	145	145	81	302	119
	136	83	283	100		136	81	290	107		136	79	296	113
	128	81	277	94		128	79	283	100		128	76	290	107
	119	78	270	87		119	76	276	93		119	73	283	100
	111	75	261	78		111	73	268	85		111	71	274	91
	102	72	252	69		102	70	258	75		102	68	265	82
	94	70	240	57		94	68	247	64		94	65	253	70
187	145	85	291	108	162	145	83	297	114	136	145	80	304	121
	136	83	285	102		136	80	292	109		136	76	298	115
	128	80	279	96		128	78	285	102		128	75	292	109
	119	77	272	89		119	75	278	95		119	72	285	102
	111	75	263	80		111	72	270	87		111	70	276	93
	102	72	254	71		102	70	260	77		102	67	267	84
	94	69	242	59		94	67	249	66		94	64	255	72

R_{LLBV5} 18[KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
216	153	92	286	103	189	153	90	293	110	162	153	87	299	116
	144	89	281	98		144	87	287	104		144	84	294	111
	135	86	275	92		135	84	281	98		135	81	288	105
	126	83	267	84		126	81	274	91		126	78	280	97
	117	80	259	76		117	78	266	83		117	75	272	89
	108	77	249	66		108	75	256	73		108	72	262	79
	99	74	238	55		99	72	244	61		99	69	251	68
207	153	91	289	106	180	153	89	295	112	153	153	86	302	119
	144	88	283	100		144	86	290	107		144	83	296	113
	135	85	277	94		135	83	283	100		135	80	290	107
	126	82	270	87		126	80	276	93		126	77	283	100
	117	79	261	78		117	77	268	85		117	74	274	91
	108	76	252	69		108	74	258	75		108	71	265	82
	99	73	240	57		99	71	247	64		99	68	253	70
198	153	90	291	108	171	153	88	297	114	144	153	85	304	121
	144	87	285	102		144	85	292	109		144	82	298	115
	135	84	279	96		135	82	285	102		135	79	292	109
	126	81	272	89		126	79	278	95		126	76	285	102
	117	78	263	80		117	76	270	87		117	73	276	93
	108	75	254	71		108	73	260	77		108	70	267	84
	99	72	242	59		99	70	249	66		99	67	255	72

R_{LLBV5} = 19 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
228	162	97	286	103	200	162	95	293	110	171	162	92	299	116
	152	93	281	98		152	91	287	104		152	89	294	111
	143	90	275	92		143	88	281	98		143	85	288	105
	135	87	267	84		133	85	274	91		133	82	280	97
	124	84	259	76		124	82	266	83		124	79	272	89
	114	80	249	66		114	78	256	73		114	76	262	79
	105	77	238	55		105	75	244	61		105	72	251	68
219	162	96	289	106	190	162	94	295	112	162	162	91	302	119
	152	93	283	100		152	91	290	107		152	88	296	113
	143	90	277	94		143	87	283	100		143	84	290	107
	133	86	270	87		133	84	276	93		133	81	283	100
	124	83	261	78		124	80	268	85		124	78	274	91
	114	80	252	69		114	78	258	75		114	75	265	82
	105	76	240	57		105	74	247	64		105	71	253	70
209	162	95	291	108	181	162	93	297	114	152	162	90	304	121
	152	92	285	102		152	90	292	109		152	86	298	115
	143	89	279	96		143	86	285	102		143	83	292	109
	133	86	272	89		133	83	278	95		133	80	285	102
	124	82	263	80		124	80	270	87		124	77	276	93
	114	79	254	71		114	77	260	77		114	74	267	84
	105	76	242	59		105	73	249	66		105	70	255	72

R_{LLBV5} = 20 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
240	170	102	286	103	210	170	100	293	110	180	170	97	299	116
	160	98	281	98		160	96	287	104		160	93	294	111
	150	95	275	92		150	93	281	98		150	90	288	105
	140	91	267	84		140	89	274	91		140	86	280	97
	130	88	259	76		130	85	266	83		130	83	272	89
	120	84	249	66		120	82	256	73		120	79	262	79
	110	81	238	55		110	78	244	61		110	76	251	68
230	170	101	289	106	200	170	99	295	112	170	170	96	302	119
	160	98	283	100		160	95	290	107		160	92	296	113
	150	94	277	94		150	92	283	100		150	89	290	107
	140	91	270	87		140	88	276	93		140	85	283	100
	130	87	261	78		130	85	268	85		130	82	274	91
	120	83	252	69		120	81	258	75		120	78	265	82
	110	80	240	57		110	78	247	64		110	75	253	70
220	170	100	291	108	190	170	98	297	114	160	170	94	304	121
	160	97	285	102		160	94	292	109		160	91	298	115
	150	93	279	96		150	91	285	102		150	87	292	109
	140	90	272	89		140	87	278	95		140	84	285	102
	130	86	263	80		130	84	270	87		130	80	276	93
	120	83	254	71		120	80	260	77		120	77	267	84
	110	79	242	59		110	77	249	66		110	73	255	72

R_{LLBV5} 21 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
252	179	107	287	104	221	179	105	293	110	189	179	102	299	116
	168	103	281	98		168	101	287	104		168	98	294	111
	158	99	275	92		158	97	281	98		158	94	288	105
	147	95	267	84		147	93	274	91		147	90	280	97
	137	92	259	76		137	89	266	83		137	86	272	89
	126	88	249	66		126	86	256	73		126	83	262	79
	116	84	238	55		116	82	244	61		116	79	251	68
242	179	106	289	106	210	179	104	295	112	179	179	100	302	119
	168	102	283	100		168	100	290	107		168	97	296	113
	158	99	277	94		158	96	283	100		158	93	290	107
	147	95	270	87		147	92	276	93		147	89	283	100
	137	91	261	78		137	88	268	85		137	85	274	91
	126	87	252	69		126	85	258	75		126	82	264	81
	116	83	240	57		116	81	247	64		116	78	253	70
231	179	105	291	108	200	179	103	297	114	168	179	99	304	121
	168	102	285	102		168	99	292	109		168	95	298	115
	158	98	279	96		158	95	285	102		158	92	292	109
	147	94	272	89		147	91	278	95		147	88	285	102
	137	90	263	80		137	88	270	87		137	84	276	93
	126	86	254	71		126	84	260	77		126	80	267	84
	116	83	242	59		116	80	249	66		116	76	255	72

$R_{LLBV5}=22[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
264	187	112	286	103	231	187	110	293	110	198	187	106	299	116
	176	108	281	98		176	105	287	104		176	102	294	111
	165	104	275	92		165	101	281	98		165	98	288	105
	154	100	267	84		154	97	274	91		154	94	280	97
	143	96	259	76		143	93	265	82		143	90	272	89
	132	92	249	66		132	89	256	73		132	86	262	79
	121	87	238	55		121	85	244	61		121	82	251	68
253	187	111	289	106	220	187	108	295	112	187	187	108	305	122
	176	107	283	100		176	104	290	107		176	101	296	113
	165	103	277	94		165	100	283	100		165	97	290	107
	154	99	270	87		154	96	276	93		154	93	283	100
	143	95	261	78		143	92	268	85		143	89	274	91
	132	91	252	69		132	88	258	75		132	85	265	82
	121	87	240	57		121	84	247	64		121	81	253	70
242	187	110	291	108	209	187	108	297	114	176	187	104	304	121
	176	106	285	102		176	104	292	109		176	100	298	115
	165	102	279	96		165	99	285	102		165	96	292	109
	154	98	272	89		154	95	278	95		154	92	285	102
	143	94	263	80		143	91	270	87		143	88	276	93
	132	90	254	71		132	87	260	77		132	83	267	84
	121	86	242	59		121	83	249	66		121	80	255	72

$R_{LLBV5}=23[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
276	196	117	286	103	242	196	115	293	110	207	196	111	299	116
	184	113	281	98		184	110	287	104		184	107	294	111
	173	108	275	92		173	106	281	98		173	103	288	105
	161	104	267	84		161	101	274	91		161	98	280	97
	150	100	259	76		150	97	266	83		150	94	272	89
	138	95	249	66		138	93	256	73		138	90	262	79
	127	91	238	55		127	88	244	61		127	85	251	68
265	196	116	289	106	230	196	114	295	112	196	196	110	302	119
	184	112	283	100		184	109	290	107		184	106	296	113
	173	108	277	94		173	105	283	100		173	101	290	107
	161	103	270	87		161	100	276	93		161	97	283	100
	150	99	261	78		150	96	268	85		150	93	274	91
	138	94	252	69		138	92	258	75		138	88	265	82
	127	90	240	57		127	87	247	64		127	84	253	70
253	196	115	291	108	219	196	112	297	114	184	196	109	304	121
	184	111	285	102		184	108	292	109		184	104	298	115
	173	107	279	96		173	104	285	102		173	100	292	109
	161	102	272	89		161	99	278	95		161	96	285	102
	150	98	263	80		150	95	270	87		150	91	276	93
	138	94	254	71		138	91	260	77		138	87	267	84
	127	89	242	59		127	86	249	66		127	83	255	72

$R_{LLBV5}=24[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
288	204	122	286	103	252	204	120	293	110	216	204	116	299	116
	192	118	281	98		192	115	287	104		192	112	294	111
	180	113	275	92		180	110	281	98		180	107	288	105
	168	108	267	84		168	106	274	91		168	102	280	97
	156	104	259	76		156	101	266	83		156	98	272	89
	144	99	249	66		144	96	256	73		144	93	262	79
	132	94	238	55		132	92	244	61		132	88	251	68
276	204	121	289	106	240	204	119	295	112	204	204	115	302	119
	192	117	283	100		192	114	290	107		192	110	296	113
	180	112	277	94		180	109	283	100		180	106	290	107
	168	107	270	87		168	105	276	93		168	101	283	100
	156	103	261	78		156	100	268	85		156	96	274	91
	144	98	252	69		144	95	258	75		144	92	265	82
	132	93	240	57		132	91	247	64		132	87	253	70
264	204	120	291	108	228	204	117	297	114	192	204	113	304	121
	192	116	285	102		192	113	292	109		192	109	298	115
	180	111	279	96		180	108	285	102		180	104	292	109
	168	107	272	89		168	104	278	95		168	99	285	102
	156	102	263	80		156	99	270	87		156	95	276	93
	144	97	253	70		144	94	260	77		144	90	267	84
	132	93	242	59		132	90	249	66		132	86	255	72

$R_{LLBV5}=25[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
300	213	127	286	103	263	213	125	293	110	225	213	121	299	116
	200	122	281	98		200	120	287	104		200	116	294	111
	188	117	275	92		188	115	281	98		188	111	288	105
	175	112	267	84		175	110	274	91		175	106	280	97
	163	108	259	76		163	105	266	83		163	101	272	89
	150	103	249	66		150	100	256	73		150	97	262	79
	138	98	238	55		138	95	244	61		138	92	251	68
288	213	126	289	106	250	213	123	295	112	213	213	120	302	119
	200	121	283	100		200	119	290	107		200	115	296	113
	188	117	277	94		188	114	283	100		188	110	290	107
	175	112	270	87		175	109	276	93		175	105	283	100
	163	107	261	78		163	104	268	85		163	100	274	91
	150	102	252	69		150	99	258	75		150	95	265	82
	138	97	240	57		138	94	247	64		138	90	253	70
275	213	126	291	108	238	213	122	297	114	200	213	118	304	121
	200	121	285	102		200	117	292	109		200	113	298	115
	188	116	279	96		188	112	285	102		188	108	292	109
	175	110	272	89		175	108	278	95		175	103	285	102
	163	106	263	80		163	103	270	87		163	98	276	93
	150	101	254	71		150	98	260	77		150	94	267	84
	138	96	242	59		138	93	249	66		138	89	255	72

$R_{LLBV5}=26[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
312	221	132	286	103	273	221	129	293	110	234	221	126	299	116
	208	127	281	98		208	124	287	104		208	121	294	111
	195	122	275	92		195	119	281	98		195	115	288	105
	182	117	267	84		182	114	274	91		182	110	280	97
	169	112	259	76		169	109	266	83		169	105	272	89
	156	106	249	66		156	104	256	73		156	100	262	79
	143	101	238	55		143	98	244	61		143	95	251	68
299	221	131	289	106	260	221	128	295	112	221	221	124	302	119
	208	126	283	100		208	123	290	107		208	119	296	113
	195	121	277	94		195	118	283	100		195	114	290	107
	182	116	270	87		182	113	276	93		182	109	283	100
	169	111	261	78		169	108	268	85		169	104	274	91
	156	105	252	69		156	102	258	75		156	99	265	82
	143	100	240	57		143	97	247	64		143	93	253	70
286	221	131	291	108	247	221	127	297	114	208	221	123	304	121
	208	125	285	102		208	122	292	109		208	118	298	115
	195	120	279	96		195	117	285	102		195	112	292	109
	182	115	272	89		182	112	278	95		182	107	285	102
	169	110	263	80		169	106	270	87		169	102	276	93
	156	105	254	71		156	101	260	77		156	97	267	84
	143	99	242	59		143	96	249	66		143	92	255	72

$R_{LLBV5}=27[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{HV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
324	230	137	286	103	284	230	134	293	110	243	230	131	299	116
	216	132	281	98		216	129	287	104		216	125	294	111
	203	126	275	92		203	124	281	98		203	120	288	105
	189	121	267	84		189	118	274	91		189	114	280	97
	176	116	259	76		176	113	266	83		176	109	272	89
	162	100	249	66		162	107	256	73		162	103	262	79
	149	105	238	55		149	102	244	61		149	98	251	68
310	230	137	289	106	270	230	133	295	112	230	230	129	302	119
	216	131	283	100		216	128	290	107		216	124	296	113
	203	126	277	94		203	122	283	100		203	118	290	107
	189	120	270	87		189	117	276	93		189	113	283	100
	176	115	261	78		176	111	268	85		176	107	274	91
	162	109	252	69		162	106	258	75		162	102	265	82
	149	104	240	57		149	101	247	64		149	96	253	70
297	230	136	291	108	257	230	132	297	114	216	230	127	304	121
	216	130	285	102		216	127	292	109		216	122	298	115
	203	125	279	96		203	121	285	102		203	117	292	109
	189	119	272	89		189	116	278	95		189	111	285	102
	176	114	263	80		176	110	270	87		176	106	276	93
	162	108	254	71		162	105	260	77		162	100	267	84
	149	103	242	59		149	99	249	66		149	95	255	72

$R_{LLBV5}=28[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
336	238	143	286	103	294	238	139	293	110	252	238	135	299	116
	224	137	281	98		224	134	287	104		224	130	294	111
	210	131	275	92		210	128	281	98		210	124	288	105
	196	125	267	84		196	122	274	91		196	118	280	97
	182	119	259	76		182	116	266	83		182	113	272	89
	168	114	249	66		168	111	256	73		168	107	262	79
	154	108	238	55		154	105	244	61		154	101	251	68
322	238	142	289	106	280	238	138	295	112	238	238	134	302	119
	224	136	283	100		224	133	290	107		224	128	296	113
	210	130	277	94		210	127	283	100		210	122	290	107
	196	124	270	87		196	121	276	93		196	117	283	100
	182	119	261	78		182	115	268	85		182	111	274	91
	168	113	252	69		168	110	258	75		168	105	265	82
	154	107	240	57		154	104	247	64		154	100	253	70
308	238	141	291	108	266	238	137	297	114	224	238	132	304	121
	224	135	285	102		224	131	292	109		224	126	298	115
	210	129	279	96		210	125	285	102		210	121	292	109
	196	123	272	89		196	120	278	95		196	115	285	102
	182	118	263	80		182	114	270	87		182	109	276	93
	168	112	254	71		168	108	260	77		168	104	267	84
	154	106	242	59		154	103	249	66		154	98	255	72

$R_{LLBV5}=29[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
348	247	148	286	103	305	247	144	293	110	261	247	140	299	116
	232	142	281	98		232	138	287	104		232	134	294	111
	218	136	275	92		218	132	281	98		218	128	288	105
	203	130	267	84		203	126	274	91		203	122	280	97
	189	123	259	76		189	120	266	83		189	116	272	89
	174	117	249	66		174	114	256	73		174	112	260	77
	160	111	238	55		160	108	244	61		160	104	251	68
334	247	.147	289	106	290	247	143	295	112	247	247	139	302	119
	232	141	283	100		232	137	290	107		232	133	296	113
	218	135	277	94		218	131	283	100		218	127	290	107
	203	129	270	87		203	125	276	93		203	121	283	100
	189	123	261	78		189	119	268	85		189	115	274	91
	174	116	252	69		174	113	258	75		174	109	265	82
	160	110	240	57		160	107	247	64		160	103	253	70
319	247	146	291	108	276	247	142	297	114	232	247	137	304	121
	232	140	285	102		232	136	292	109		232	131	298	115
	218	134	279	96		218	130	285	102		218	125	292	109
	203	128	272	89		203	124	278	95		203	119	285	102
	189	122	263	80		189	118	270	87		189	113	276	93
	174	115	254	71		174	112	260	77		174	107	267	84
	160	109	242	59		160	106	249	66		160	101	255	72

$R_{LLBV5}=30[K\Omega]$

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
360	255	153	286	103	315	255	149	293	110	270	255	145	299	116
	240	146	281	98		240	143	287	104		240	139	294	111
	225	140	275	92		225	137	281	98		225	133	288	105
	210	134	267	84		210	131	274	91		210	126	280	97
	195	127	259	76		195	124	266	83		195	120	272	89
	180	121	249	66		180	118	256	73		180	114	262	79
	165	115	238	55		165	112	244	61		165	108	251	68
345	255	152	289	106	300	255	148	295	112	255	255	143	302	119
	240	145	283	100		240	142	290	107		240	137	296	113
	225	139	277	94		225	136	283	100		225	131	290	107
	210	133	270	87		210	129	276	93		210	125	283	100
	195	126	261	78		195	123	268	85		195	118	274	91
	180	120	252	69		180	117	258	75		180	112	265	82
	165	114	240	57		165	110	247	64		165	106	253	70
330	255	151	291	108	285	255	147	297	114	240	255	142	304	121
	240	144	285	102		240	140	292	109		240	135	298	115
	225	138	279	96		225	134	285	102		225	129	292	109
	210	132	272	89		210	128	278	95		210	123	285	102
	195	125	263	80		195	122	270	87		195	117	276	93
	180	119	254	71		180	115	260	77		180	110	267	84
	165	113	242	59		165	109	249	66		165	104	255	72

R_{LLBV5} = 31 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
372	264	158	286	103	326	264	154	293	110	279	264	150	299	116
	248	151	281	98		248	148	287	104		248	143	294	111
	233	145	275	92		233	141	281	98		233	137	288	105
	217	138	267	84		217	135	274	91		217	130	280	97
	202	131	259	76		202	128	266	83		202	124	272	89
	186	125	249	66		186	122	256	73		186	117	262	79
	171	118	238	55		171	115	244	61		171	111	251	68
357	264	157	289	106	310	264	153	295	112	264	264	148	302	119
	248	150	283	100		248	147	290	107		248	142	296	113
	233	144	277	94		233	140	283	100		233	135	290	107
	217	137	270	87		217	133	276	93		217	129	283	100
	202	130	261	78		202	127	268	85		202	122	274	91
	186	124	252	69		186	120	258	75		186	116	265	82
	171	117	240	57		171	114	247	64		171	109	253	70
341	264	153	291	108	295	264	152	297	114	248	264	146	304	121
	248	149	285	102		248	145	292	109		248	140	298	115
	233	142	279	96		233	139	285	102		233	133	292	109
	217	136	272	89		217	132	278	95		217	127	285	102
	202	129	263	80		202	125	270	87		202	120	276	93
	186	123	254	71		186	119	260	77		186	114	267	84
	171	116	242	59		171	112	249	66		171	107	255	72

R_{LLBV5} = 32 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
384	272	163	286	103	336	272	159	293	110	288	272	155	299	116
	256	156	281	98		256	153	287	104		256	148	294	111
	240	149	275	92		240	146	281	98		240	141	288	105
	224	142	267	84		224	139	274	91		224	134	280	97
	208	135	259	76		208	132	266	83		208	128	272	89
	192	129	249	66		192	125	256	73		192	121	262	79
	176	122	238	55		176	118	244	61		176	114	251	68
368	272	162	289	106	320	272	158	295	112	272	272	153	302	119
	256	155	283	100		256	151	290	107		256	146	296	113
	240	148	277	94		240	144	283	100		240	139	290	107
	224	141	270	87		224	137	276	93		224	133	283	100
	208	134	261	78		208	136	268	85		208	126	274	91
	192	127	251	68		192	124	258	75		192	119	265	82
	176	121	240	57		176	117	247	64		176	112	253	70
352	272	161	291	108	304	272	157	297	114	256	272	151	304	121
	256	154	285	102		256	150	292	109		256	144	298	115
	240	147	279	96		240	143	285	102		240	137	292	109
	224	140	272	89		224	136	278	95		224	131	285	102
	208	133	263	80		208	129	270	87		208	124	276	93
	192	126	254	71		192	122	260	77		192	117	267	84
	176	120	242	59		176	116	249	66		176	110	255	72

R_{LLBV5} = 33 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
396	281	168	286	103	346	281	164	293	110	297	281	160	299	116
	264	161	281	98		264	157	287	104		264	153	294	111
	248	154	275	92		248	150	281	98		248	145	288	105
	231	147	267	84		231	143	274	91		231	138	280	97
	215	139	259	76		215	136	266	83		215	131	272	89
	198	132	249	66		198	129	256	73		198	125	262	79
	182	125	238	55		182	122	244	61		182	117	251	68
380	281	167	289	106	330	281	163	295	112	281	281	158	302	119
	264	160	283	100		264	156	290	107		264	151	296	113
	248	153	277	94		248	149	283	100		248	144	290	107
	231	145	270	87		231	142	276	93		231	137	283	100
	215	138	261	78		215	134	268	85		215	129	274	91
	198	131	252	69		198	127	258	75		198	122	265	82
	182	124	240	57		182	120	247	64		182	115	253	70
363	281	166	291	108	314	281	161	297	114	264	281	156	304	121
	264	158	285	102		264	154	292	109		264	149	298	115
	248	151	279	96		248	147	285	102		248	142	292	109
	231	144	272	89		231	140	278	95		231	135	285	102
	215	137	263	80		215	133	270	87		215	127	276	93
	198	130	254	71		198	126	260	77		198	120	267	84
	182	123	242	59		182	119	249	66		182	113	255	72

R_{LLBV5} = 34〔KΩ〕

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
408	289	173	286	103	357	289	169	293	110	306	289	165	299	116
	272	166	281	98		272	162	287	104		272	157	294	111
	255	158	275	92		255	155	281	98		255	150	288	105
	238	151	267	84		238	147	274	91		238	142	280	97
	221	143	259	76		221	140	266	83		221	135	272	89
	204	136	249	66		204	132	256	73		204	128	262	79
	187	129	238	55		187	125	244	61		187	120	251	68
391	289	172	289	106	340	289	168	295	112	289	289	163	302	119
	272	165	283	100		272	160	290	107		272	155	296	113
	255	157	277	94		255	153	283	100		255	148	290	107
	238	150	270	87		238	146	276	93		238	140	283	100
	221	142	261	78		221	138	268	85		221	133	274	91
	204	135	252	69		204	131	258	75		204	126	265	82
	187	127	240	57		187	124	247	64		187	118	253	70
374	289	171	291	108	323	289	166	297	114	272	289	160	304	121
	272	163	285	102		272	159	292	109		272	153	298	115
	255	156	279	96		255	151	285	102		255	146	292	109
	238	148	272	89		238	144	278	95		238	138	285	102
	221	141	263	80		221	137	270	87		221	131	276	93
	204	134	254	71		204	129	260	77		204	124	267	84
	187	126	242	59		187	122	249	66		187	116	255	72

R_{LLBV5} = 35〔KΩ〕

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
420	298	178	286	103	368	298	174	293	110	315	298	169	299	116
	280	170	281	98		280	167	287	104		280	162	294	111
	263	163	275	92		263	159	281	98		263	154	288	105
	245	155	267	84		245	151	274	91		245	146	280	97
	228	147	259	76		228	144	266	83		228	139	272	89
	210	140	249	66		210	136	256	73		210	131	262	79
	193	132	238	55		193	128	244	61		193	123	251	68
403	298	177	289	106	350	298	173	295	112	298	298	167	302	119
	280	169	283	100		280	165	290	107		280	160	296	113
	263	162	277	94		263	157	283	100		263	152	290	107
	245	154	270	87		245	150	276	93		245	144	283	100
	228	146	261	78		228	142	268	85		228	137	274	91
	210	139	252	69		210	134	258	75		210	129	265	82
	193	131	240	57		193	127	247	64		193	122	253	70
385	298	176	291	108	333	298	171	297	114	280	298	165	304	121
	280	168	285	102		280	164	292	109		280	158	298	115
	263	160	279	96		263	156	285	102		263	150	292	109
	245	153	272	89		245	148	278	95		245	142	285	102
	228	145	263	80		228	141	270	87		228	135	276	93
	210	137	254	71		210	133	260	77		210	127	267	84
	193	130	242	59		193	125	249	66		193	119	255	72

R_{LLBV5} = 36〔KΩ〕

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
432	306	183	286	103	378	306	179	293	110	324	306	174	299	116
	288	175	281	98		288	171	287	104		288	166	294	111
	270	167	275	92		270	163	281	98		270	158	288	105
	252	159	267	84		252	155	274	91		252	150	280	97
	234	151	259	76		234	147	266	83		234	142	272	89
	216	143	249	66		216	140	256	73		216	135	262	79
	198	135	238	55		198	132	244	61		198	127	251	68
414	306	182	289	106	360	306	178	295	112	306	306	172	302	119
	288	174	283	100		288	170	290	107		288	164	296	113
	270	166	277	94		270	162	283	100		270	156	290	107
	252	158	270	87		252	154	276	93		252	148	283	100
	234	150	261	78		234	146	268	85		234	140	274	91
	216	142	252	69		216	138	258	75		216	133	265	82
	198	134	240	57		198	130	247	64		198	125	253	70
396	306	181	291	108	342	306	176	297	114	288	306	170	304	121
	288	173	285	102		288	168	292	109		288	162	298	115
	270	165	279	96		270	160	285	102		270	154	292	109
	252	157	272	89		252	152	278	95		252	146	285	102
	234	149	263	80		234	144	270	87		234	138	276	93
	216	141	254	71		216	136	260	77		216	130	267	84
	198	133	242	59		198	128	249	66		198	122	255	72

R_{LLBV5} = 37[KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
444	315	188	286	103	389	315	184	293	110	333	315	179	299	116
	296	180	281	98		296	176	287	104		296	171	294	111
	278	172	275	92		278	168	281	98		278	163	288	105
	259	164	267	84		259	160	274	91		259	154	280	97
	241	155	259	76		241	151	266	83		241	146	272	89
	222	147	249	66		222	143	256	73		222	138	262	79
	204	139	238	55		204	135	244	61		204	130	251	68
426	315	187	289	106	370	315	183	295	112	315	315	177	302	119
	296	179	283	100		296	174	290	107		296	169	296	113
	278	171	277	94		278	166	283	100		278	161	290	107
	259	162	270	87		259	158	276	93		259	152	283	100
	241	154	261	78		241	150	268	85		241	144	274	91
	222	146	252	69		222	142	258	75		222	136	265	82
	204	138	240	57		204	133	247	64		204	128	253	70
407	315	186	291	108	352	315	181	297	114	296	315	175	304	121
	296	178	285	102		296	173	292	109		296	166	298	115
	278	169	279	96		278	165	285	102		278	158	292	109
	259	161	272	89		259	156	278	95		259	150	285	102
	241	153	263	80		241	148	270	87		241	142	276	93
	222	145	254	71		222	140	260	77		222	134	267	84
	204	136	242	59		204	132	249	66		204	126	255	72

R_{LLBV5} = 38[KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
456	323	193	286	103	399	323	189	293	110	342	323	184	299	116
	304	185	281	98		304	181	287	104		304	175	294	111
	285	176	275	92		285	172	281	98		285	167	288	105
	266	168	267	84		266	164	274	91		266	158	280	97
	247	159	259	76		247	155	266	83		247	150	272	89
	228	151	249	66		228	147	256	73		228	141	262	79
	209	142	238	55		209	138	244	61		209	133	251	68
437	323	192	289	106	380	323	188	295	112	323	323	182	302	119
	304	183	283	100		304	179	290	107		304	173	296	113
	285	175	277	94		285	171	283	100		285	165	290	107
	266	167	270	87		266	162	276	93		266	156	283	100
	247	158	261	78		247	154	268	85		247	148	274	91
	228	150	252	69		228	145	258	75		228	139	265	82
	209	141	240	57		209	137	247	64		209	131	253	70
418	323	191	291	108	361	323	186	297	114	304	323	179	304	121
	304	182	285	102		304	177	292	109		304	171	298	115
	285	174	279	96		285	169	285	102		285	162	292	109
	266	165	272	89		266	160	278	95		266	154	285	102
	247	157	263	80		247	158	270	87		247	146	276	93
	228	148	254	71		228	143	260	77		228	137	267	84
	209	140	242	59		209	135	249	66		209	129	255	72

R_{LLBV5} = 39[KΩ]

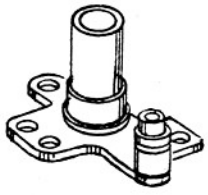
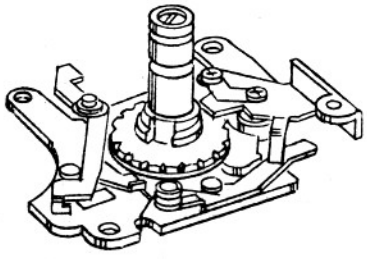
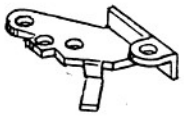
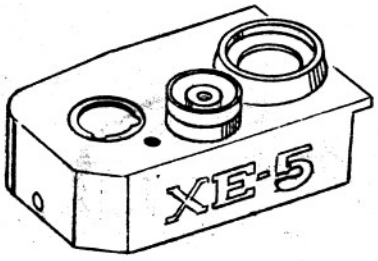
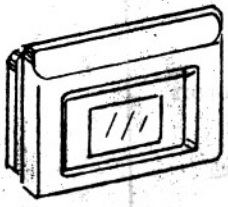
R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
468	332	199	286	103	410	332	194	293	110	351	332	189	299	116
	312	190	281	98		312	185	287	104		312	180	294	111
	293	181	275	92		293	177	281	98		293	171	288	105
	273	172	267	84		273	168	274	91		273	162	280	97
	254	163	259	76		254	159	266	83		254	154	272	89
	234	154	249	66		234	150	256	73		234	145	262	79
	215	146	238	55		215	142	244	61		215	136	251	68
449	332	197	289	106	390	332	193	295	112	332	332	187	302	119
	312	189	283	100		312	184	290	107		312	178	296	113
	293	180	277	94		293	175	283	100		293	169	290	107
	273	171	270	87		273	166	276	93		273	160	283	100
	254	162	261	78		254	157	268	85		254	151	274	91
	234	153	252	69		234	149	258	75		234	143	265	82
	215	144	240	57		215	140	247	64		215	134	253	70
429	332	196	291	108	371	332	191	297	114	312	332	184	304	121
	312	187	285	102		312	182	292	109		312	175	298	115
	293	178	279	96		293	173	285	102		293	167	292	109
	273	169	272	89		273	164	278	95		273	158	285	102
	254	161	263	80		254	156	270	87		254	149	276	93
	234	152	254	71		234	147	260	77		234	140	267	84
	215	143	242	59		215	138	249	66		215	132	255	72

R_{LLBV5} = 40 [KΩ]

R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)	R_{HHBV5} (KΩ)	R_{LLBV0} (KΩ)	R_P (KΩ)	V_{BV0} (mV)	V_{BV10} (mV)
480	340	204	286	103	420	340	199	293	110	360	340	194	299	116
	320	195	281	98		320	190	287	104		320	185	294	111
	300	185	275	92		300	181	281	98		300	176	288	105
	280	176	267	84		280	172	274	91		280	166	280	97
	260	167	259	76		260	163	266	83		260	157	272	89
	240	158	249	66		240	154	256	73		240	148	262	79
	220	149	238	55		220	145	244	61		220	139	251	68
460	340	202	289	106	400	340	198	295	112	340	340	191	302	119
	320	193	283	100		320	188	290	107		320	182	296	113
	300	184	277	94		300	179	283	100		300	173	290	107
	280	175	270	87		280	170	276	93		280	164	283	100
	260	166	261	78		260	161	268	85		260	155	274	91
	240	157	252	69		240	152	258	75		240	146	265	82
	220	148	240	57		220	143	247	64		220	137	253	70
440	340	201	291	108	380	340	196	297	114	320	340	189	304	121
	320	192	285	102		320	187	292	109		320	180	298	115
	300	183	279	96		300	178	285	102		300	171	292	109
	280	174	272	89		280	169	278	95		280	162	285	102
	260	165	263	80		260	159	270	87		260	153	276	93
	240	155	254	71		240	150	260	77		240	144	267	84
	220	146	242	59		220	141	249	66		220	135	255	72

This parts list comprises exclusive parts for the 087.
Please use the parts list of 081(X E), 082(X E - 1) and 086(X E - 7) for all other parts unlisted here, because they are common to 081, 082 and 086 respectively.

この部品表は087（XE−5）専用部品のみをまとめたものです。この部品表以外の部品については081（XE）、082（XE−1）、086（XE−7）と共通ですので081、082、086パーツリストをご利用下さい。

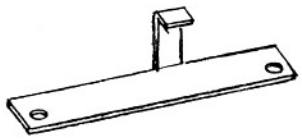
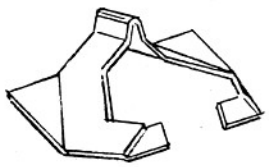
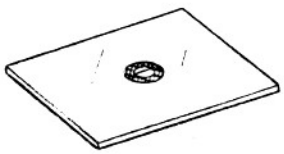
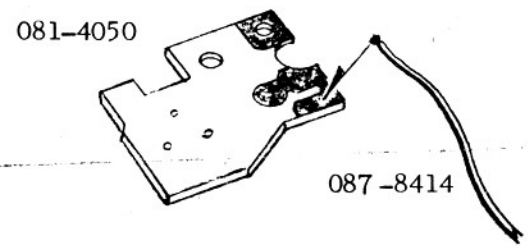
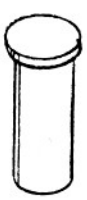
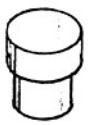
Part No. & Part name	Sketch	Unit
087 - 0150 - 01 Film advance axis bearing base plate set 巻取軸受台板セット		1
087 - 0270 - 01 Shutter dial base plate set シャッターダイヤル台板セット * Coupled elements (except 087-2010) are common to 087-0270 087−2010 以外の結合内容は 081−0270 と共通		1
(087 - 0270 - 01) 087 - 2010 - 02 Pulley holder プーリーホルダー		1
087 - 0360 - 01 X E - 5 Top cover set(Right) XE−5上カバーセット（右） * Top cover tape(#1042) are common to 081 上カバー保護テープ（#1042）は081と共通		1
(087 - 0360 - 01) 087 - 0361 - 01 Counter window set カウンター窓枠セット		1

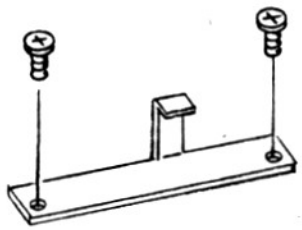
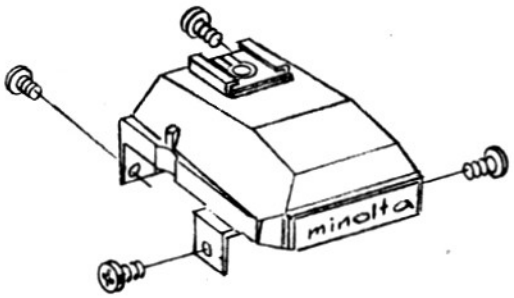
Part No.	Part Name	Part No.	Part Name
087 - 0883	Penta prism set ペンタプリズムセット	081 - 0883	Penta prism set ペンタプリズムセット
087 - 1006	Front cover 前カバー	081 - 1006	Front cover 前カバー
081 - 1028	Top cover second plate(Right) 上カバー補助板（右）	081 - 0317	Top cover second plate(Right) 上カバー補助板（右）
087 - 1033	Penta cover receiver ペンタカバー受け		Uselessness（使用せず）
087 - 1050	Eye-piece cap アイピースキャップ		Uselessness（使用せず）
087 - 1053	Accessory shoe spring アクセサリーシュースプリング	081 - 1053	Accessory shoe spring アクセサリーシュースプリング
087 - 2009	Shutter speed dial pulley S.Sダイヤルプーリー	081 - 2009	Shutter speed dial pulley S.Sダイヤルプーリー
087 - 2010	Pulley holder プーリーホルダー	081 - 0273	Pulley holder set プーリーホルダーセット
087 - 3015	Film advance nail spring 巻取爪スプリング	081 - 3015	Film advance nail spring A 巻取爪スプリングA
087 - 3066	Film advance lever decoration ring 巻上げレバー飾り環	081 - 3066	Film advance lever decoration ring 巻上げレバー飾り環
087 - 3073	Film advance lever washer 巻上げレバーワッシャー	081 - 3073	Film advance lever washer 巻上げレバーワッシャー
087 - 5003	Space plate 視野枠	081 - 5003	Space plate 間隔板
087 - 5005	Restriction frame - A 制限枠 A	081 - 5005	Restriction frame - A 制限枠 A
087 - 5027	CdS holder support plate CdS前クラ保持板		Uselessness（使用せず）
087 - 5052	Meter figure plate メーター目盛板	081 - 5052	Meter figure plate メーター目盛板
081 - 5068	Penta pressure plate ペンタ押え板	081 - 0455	Penta pressure plate ペンタ押え板
087 - 5805	Fresnel lens 焦点板	081 - 5805	Fresnel lens 焦点板
087 - 8414	Lead wire(Brown L = 140mm) リード線（茶 L=140mm）		Uselessness（使用せず）
087 - 9234	Body light shield pin - A ボデー遮光ピン A		Uselessness（使用せず）
087 - 9235	Body light shield pin - B ボデー遮光ピン B		Uselessness（使用せず）
9612 - 1430 - 12	Phillips type screw (Use to 5027)（5027取付用）		Uselessness（使用せず）
9612 - 1740 - 12	Phillips type screw (Use to 087-0603)(0603取付用)	9611- 1740 - 12	Phillips type screw (Use to 081-0603)(0603取付用)

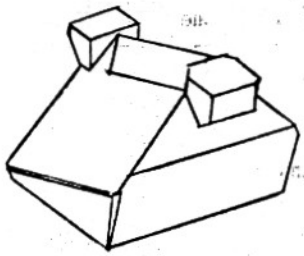
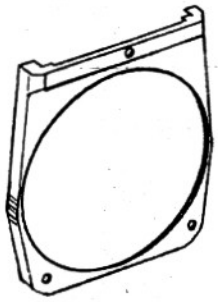
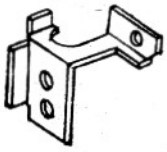
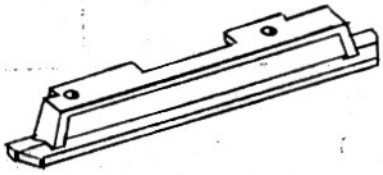
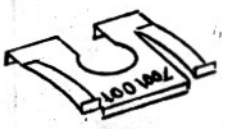
Parts List except that 081 series.

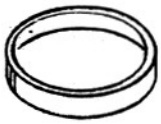
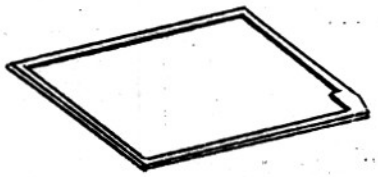
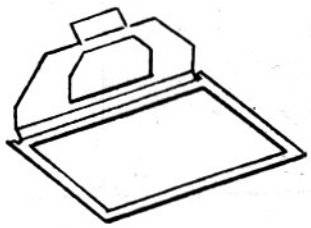
０８１より取り除く部品一覧表

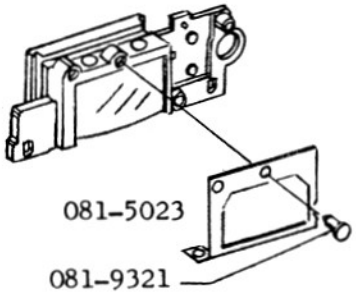
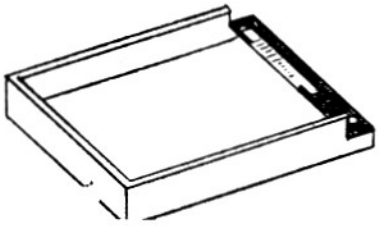
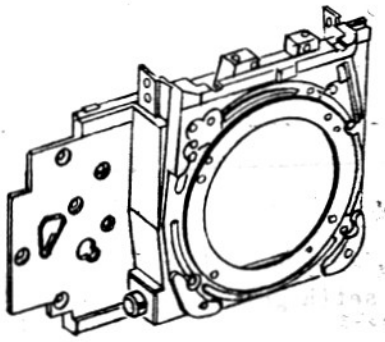
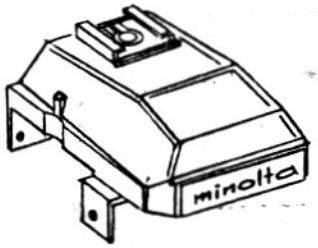
Part No.	Page	Part No.	Page	Part No.	Page
081 – 0116	16	081 – 3064	1	081 – 5059	13
081 – 0171	17	081 – 3069	17	081 – 5061	13
081 – 0273	7	081 – 3070	17	081 – 5065	11
081 – 0312	3	081 – 3422	17	081 – 5075	13
081 – 0314	1	081 – 3423	16	081 – 5804	12
081 – 0315	13	081 – 3424	17	081 – 5815	13
081 – 0316	13	081 – 3425	16	081 – 5816	3
081 – 0317	13	081 – 3426	16	081 – 5819	3
081 – 0351	1	081 – 3427	16	081 – 8425	13
081 – 0370	13	081 – 5016	12	081 – 9046	16
081 – 0441	8	081 – 5021	8	081 – 9110	13
081 – 0443	8	081 – 5022	8	081 – 9121	1
081 – 0455	12	081 – 5031	1	081 – 9325	8
081 – 0573	13	081 – 5033	1	081 – 9422	13
		081 – 5036	13		
081 – 2244	12	081 – 5041	13	9611–1425–07 Use to 0573 & 3424	13, 17
081 – 2265	13	081 – 5044	13	9611–1435–01 Use to 0171	17
081 – 2266	13	081 – 5045	13	9615–1450–07 Use to 0316	13
081 – 2267	13	081 – 5054	13	9615–1730–07 Use to 0370	13
081 – 3029	17	081 – 5055	13	9691–1735–04 Use to 0312	1
081 – 3054	17	081 – 5057	13	9695–1735–07 Use to 0441	8
081 – 3059	6	081 – 5058	13	9792–3168–50 Use to 2265	13

Part No. & Part name	Sketch	Unit
087 - 5027 - 01 CdS holder support plate CdS 前クラ保持板		1
087 - 5068 - 01 -02 Penta pressure plate ペンタ押え板		1
087 - 5805 - 01 Fresnel lens 焦 点 板		1
087 - 8414 - 01 Lead wire(Brown L = 140mm) リード線 （茶 L＝140㎜）		1
087 - 9234 - 01 Body light shield pin - A ボデー遮光ピンA		1
087 - 9235 - 01 Body light shield pin - B ボデー遮光ピンB		2

Part No. & Part name	Sketch	Unit
9612 - 1430 - 01 Phillips type screw 十字穴付きなべ頭小ねじ		2
9612 - 1740 - 12 Phillips type screw 十字穴付きなべ頭小ねじ		4

Part No. & Part name	Sketch	Unit
087 - 0883 - 01 Penta prism set ペンタプリズムセット		1
087 - 1006 - 01 Front cover 前カバー		1
087 - 1028 - 02 Top cover second plate(Right) 上カバー補助板（右）		1
087 - 1033 - 02 Penta cover receiver ペンタカバー受け		1
087 - 1050 - 01 Eye-piece cap アイピースキャップ		1
087 - 1053 - 02 Accessory shoe spring アクセサリーシュースプリング		1

Part No. & Part name	Sketch	Unit
087 - 2009 - 01 Shutter speed dial pulley S.S ダイヤルプーリー		1
087 - 3015 - 01 Film advance nail spring 巻取爪スプリング		1
087 - 3066 - 01 Film advance lever decoration ring 巻上げレバー飾り環		1
087 - 3073 - 01 Film advance lever washer 巻上げレバーワッシャー		1
087 - 5003 - 01 Space plate 視野枠		1
087 - 5005 - 01 Restriction frame - A 制限枠 A		1

Part No. & Part name	Sketch	Unit
087 - 0440 - 01 Eye-piece frame set 接眼枠セット		1
087 - 0452 - 01 Penta frame set ペンタ枠セット		1
(087 - 0452 - 01) 087 - 5052 - 03 Meter figure plate メータ目盛板		1
087 - 0571 - 01 Front base plate set 前枠セット		1
087 - 0603 - 01 Penta prism cover set ペンタカバーセット * Coupled elemente are common to 081-0603 結合内容は 081-0603 と共通		1